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Re-education of the aphasic with the emphasis on the young adult

Dorothy Britton

WASHINGTON UNIVERSITY
Department of Speech and Hearing

RE-EDUCATION OF THE APHASIC WITH EMPHASIS ON THE YOUNG ADULT

by
Dorothy Britton

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CHAPTER I

INTRODUCTION AND PURPOSE

An external blow or an internal hemorrhage or disease which damages or isolates certain areas of the brain can deprive a human being of his normal ability to use or understand language in its various forms of speech, reading and writing. The many kinds and degrees of language disabilities which result from such interruption of cerebral function are grouped under the generic heading "aphasia."

The majority of the cases of adult aphasia who come to the speech pathologist in peace times are older men and women who have had a cerebral hemorrhage or thrombosis. Younger traumatic or post-operative cases are fewer in number. Although the elderly aphasic often shows satisfactory progress, there is always the possibility of another cerebral insult which might cause death or obliterate previous rehabilitative progress. The opportunity to study large groups of young adults where the lesion is stationary and the general health is satisfactory, generally comes during or immediately following a war as the aftermath of head wounds and skull fractures.

A group of young aphasic veterans of World War I stimulated interest in the development of techniques described below for the rehabilitation of similar casualties of World War II.

Toward the end of the first World War several brain-injured soldiers, who had lost their ability to speak or read as a result of the injury, were sent to the Central Institute for the Deaf[1] for language therapy. The teacher assigned to work with these men had no previous experience with aphasia, but she reasoned that methods which were successful in teaching speech to the deaf might be applicable. Therefore, a program was developed, which was modified to fit specific needs as the teaching progressed.

During the teaching of these adults, McGinnis[2] noted similarities between their speech difficulties and learning reactions and those of certain children with residual hearing who were especially difficult to teach. Further investigation convinced her "that there might be a congenital disability similar to the acquired injuries that destroyed the powers of speech."[3] She found some descriptions in the literature of such manifestations in children, but no teaching methods to overcome them were reported. Therefore, drawing upon her experience in teaching speech to deaf children and to aphasic adults, she

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[1]Central Institute for the Deaf and Speech Correction, St. Louis, Missouri.

[2]McGinnis, Mildred A., The Association Method for Diagnosis and Treatment of Congenital Aphasia, Unpublished Masters Thesis, Washington University, June, 1939.

[3]Ibid., p. 2.

she devised teaching procedures, which she called the Association Method, to fit the needs of these children.

The simplest and yet reasonably comprehensive definition of aphasia is given by Webster[4] as:

> "Total or partial loss of the use or understanding of language, the vocal organs remaining intact. It results from injury or disease of the brain."

Although evidence of "injury or disease of the brain" was usually lacking in children, the impairment of use or understanding of language was found where hearing was good in the presence of normal intelligence, or where the loss was not severe enough to prevent some acquisition of speech.

The Department of Speech Correction at Central Institute for the Deaf evolved from the experimental teaching given a selected group of children whose language and learning difficulties were more similar to the adult aphasic than to the deaf or to the mentally defective with whom some of them had been classified. The teaching procedures have since been used with many aphasic children and adults, and also found applicable, with some modifications, to other types of speech defects.

The procedures of the Association Method as used to teach the aphasic child have been reported by McGinnis.[5] Its use in the teaching of aphasic adults has not been

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[4] Websters Collegiate Dictionary, 4th ed., 1933.

[5] McGinnis, Op. cit.

presented. It is the purpose of this essay to describe the clinical application of the method to a group of young adult aphasics, who incurred brain injuries in World War II. The general principles and procedures are described, and selected case histories are presented in some detail to show modifications and deviations to fit specific needs of the individual.

There can be no dogmatic rules for treatment of any disorder complicated by as many variables as aphasia, but principles and procedures which have been empirically successful should be of interest to speech pathologists and therapists.

CHAPTER II

REVIEW OF LITERATURE

In much of the earlier literature on aphasia, cases were collected which gave evidence of certain localizations of language function centers within the brain, but as soon as a theory was proposed exceptions would appear. Some of the studies contributed valuable additions to knowledge of the anatomy of the central nervous system, but none presented a theory of aphasia which could be consistently accepted.

Two theoretical schools of thought, the anatomical and the psychological, can be historically delineated. The adherents of the anatomical school are typified by the conviction of Dax[1] that the anatomical structure for speech was located on the left side of the brain, and it progressed to the point of detailed diagrams of circumscribed centers for each aspect of language. The use of schematic diagrams multiplied until confusion was rampant. Henschen[2] made an extensive study of autopsy material at the beginning of the twentieth century and carried anatomic localization in the brain to a very fine point in relation to speech, reading, writing, arithmetic, and even music.

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[1] Nielsen, J. M., Agnosia, Apraxia, Aphasia, 2nd ed., p. 2.

[2] Ibid., p. 11.

The psychological school, on the other hand, went almost as far in denunciation of specific centers, on the theory that the brain functions as a whole. Head[3] rebelled against his early training in the anatomical school and advanced new theories which were closely allied to the neglected works of Jackson.[4] Although Head's viewpoint was predominantly psychological, he did not exclude anatomical relationships between language usage and certain more or less specific areas of the brain. According to Goldstein,[5] the result of the acceptance of the theories of Head, Jackson and others who opposed the anatomic school "was great scepticism regarding localization in general." Thus the pendulum swung from one viewpoint to the other, vascillating between anatomical and psychological theories. There are still two main schools of thought on aphasia. However, Goldstein[6] and Weisenburg and McBride[7] who stress the psychological aspects of aphasia also believe that the location of the lesion influences the language disabilities

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[3]Head, Henry, Aphasia and Kindred Disorders of Speech, I, p. vii-x.

[4]Ibid., p. 30-53.

[5]Goldstein, Kurt, Language and Language Disturbances, p. 49.

[6]Goldstein, Kurt, After Effects of Brain Injuries, pp. 69-91.

[7]Weisenburg, T., McBride, K. E., Aphasia, pp. 444-447.

which occur, and even as enthusiastic an anatomist as Nielsen[8] expressed the belief that three types of approach, anatomic, physiological and psychological, are necessary for a complete study of aphasia.

There are several excellent histories of the medical aspects of the study of aphasia. Those of Head[9] and Weisenburg and McBride[10] from the psychological viewpoint, and Nielsen[11] from the anatomical are perhaps the most thorough. The story of the development of medical study and the advance in knowledge of the subject can be followed from Gall through Broca and Jackson to our contemporaries, Nielsen, Goldstein and Weisenburg.

There has been comparatively little written on the subject of speech rehabilitation of the aphasic until recent years. The attitude of the medical profession toward the possibility of successful retraining was not encouraging. According to Goldstein,[12] a neurologist himself:

> "Treatment of aphasia was not and is not very popular among neurologists. Usually the attitude was one of pessimism as to whether one can help these patients by systematic training and it was said: Either

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[8]Nielsen, op. cit., p. 12.

[9]Head, op. cit., pp. 1-141.

[10]Weisenburg, T., and McBride, K. E., Aphasia. pp. 6-118.

[11]Nielsen, op. cit., pp. 1-24.

[12]Goldstein, op. cit., p. 325.

> the condition improves spontaneously or it remains essentially unchanged in spite of all attempts at retraining."

This attitude was understandable in apoplectic cases where age or general physical condition make the prognosis less promising. Goldstein stated, however, that even these cases often respond to training better than has been generally assumed. He stressed retraining of the brain-injured as important, particularly retraining of the young patients suffering from gunshot wounds in war.[13] Among the medical writers Goldstein and Weisenburg, working with McBride, have made special studies of retraining.

Belief in the value of speech training for aphasics and interest in procedures of such teaching spread slowly until World War II, when extensive programs for teaching and research were set up in many hospitals of the armed services. The growth of interest can be traced through the literature. Mills,[14] as early as 1904, reported a case of aphasia which improved with training. Singer and Low[15] followed a patient from 1904 to 1929 where no improvement was shown for two years without training, but who was enabled to cook and run her home after a teaching program was established. A small start in speech training was made

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[13] Ibid.

[14] Mills, Charles K., Treatment of Aphasia by Training, Journal American Medical Association, XXXIII, pp. 1940-1949, 1904.

[15] Singer, H. D., Low, A. A., The Brain in a case of Motor Aphasia, Archives Neurology and Psychiatry, XXIX, pp. 162-165, 1933.

in one army hospital in this country after World War I.[16] Some work was done in St. Louis[17] at the same time and there were probably other scattered efforts, many of which were never reported. More work was done in Germany with the war injured by Goldstein[18] Head made his study of English veterans, and his "Case No. 2"[19] showed improvement when taught by a member of the family, who was a trained kindergarten teacher without previous experience with aphasia. Most of the articles which appeared in the journals between the two World Wars showed more interest in testing methods and classification than consideration of teaching procedures for the rehabilitation of speech.

Since the beginning of World War II, when it became obvious that many young men would suffer head trauma or cerebral insult through shell-wound, accident or high fever, the tenor of the articles in the periodicals devoted to the rehabilitation of speech has swung toward discussions of teaching programs and general rehabilitation.

Backus[20] described the early program in the Percy

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[16] Richardson, C. W., Reconstruction Section of Hearing and Speech, Laryngoscope, XXX, pp. 487-490, 1920.

[17] Goldstein, Max A., Problems of the Deaf, p. 156.

[18] Goldstein, Kurt, After Effects of Brain-Injuries in War, pp. 66-67.

[19] Head, op. cit., XI, p. 14.

[20] Backus, Ollie L., The Rehabilitation of Aphasic Veterans, Journal Speech Disorders, X, ii, pp. 149-153, 1945.

Jones General and Convalescent Hospital in Battle Creek, Michigan in which she outlined an intensive type of program of individual and group therapy which included five to seven hours daily attendance at the speech clinic. The program at the same clinic was later elaborated by Sheehan[21] who was a clinician from its inception and later headed a staff of six which included two trained speech therapists and four associates with especially needed skills. Huber[22] presented some of the problems encountered in the program for aphasics at Halloran General Hospital on Staten Island, New York where a staff of correctionists taught each aphasic patient several hours a day either individually or in groups. Peacher,[23] a Captain in the Medical Corps at the time of writing, described various speech disorders encountered in several army hospitals and the organization of a clinic to assist in their treatment. Peacher's reports were not confined to the speech problems of aphasia.

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[21] Sheehan, Vivian M., Rehabilitation of Aphasics in an Army Hospital, Journal Speech Disorders, XI, pp. 149-157, 1946.

[22] Huber, Mary, Linguistic Problems of Brain-Injured Servicemen, Journal Speech Disorders, XI, pp. 143-147, 1946.

[23] Peacher, William G., Speech Disorders in World War II, Journal Speech Disorder, X, pp. 153-161, 1945.

Peacher, William G., Speech Disorders in World War II; III, Dysarthria, Journal Speech Disorders, X, pp. 287-291, 1945.

Peacher, William G., Speech Disorders in World War II; V, Organization of a Clinic, Journal Speech Disorders, XI, pp. 233-239, 1946.

Wepman[24] presented the overall planning of a physical plant, staff organization and curriculum for the training of brain-injured soldiers with aphasia in a hospital on the west coast. Welsh[25] described a speech clinic in a Veterans' Hospital, which continued the training of patients after their discharge from the army.

Most of the reports contained only general outlines of teaching procedures and principles. It is likely that additional details will appear in future publications. Granich[26] presented a variety of procedures in his book on retraining methods and classifications used in an army hospital under his direction. Backus[27] wrote a chapter on retraining aphasics in the recent edition of West, Kennedy and Carr. Goldstein[28] also described some teaching techniques in his latest book on aphasia.

The majority of the reports were from the larger army or navy centers where extended programs and adequate staffing was possible. Although provision was made for a

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[24]Wepman, J. M., The organization of Therapy for Aphasia, Journal Speech Disorders, XII, pp. 405-409, 1947.

[25]Welch, A. M., Description of Speech Clinic at Veterans Hospital, Journal Speech and Hearing Disorders, XIII, pp. 372, 375, 1948.

[26]Granich, L., Aphasia: A Guide to Retraining.

[27]Backus, O. L., The Rehabilitation of Persons With Aphasia, The Rehabilitation of Speech, West, Kennedy and Carr, Rev. ed., XIV, pp. 439-466.

[28]Goldstein, op. cit., pp. 325-344.

speech therapist in many hospitals there was a scarcity of teachers trained for working with the aphasic. Even qualified speech correctionists have often had inadequate training or experience in this specific field.

It is hoped that the rich experience gained in treating service-incurred aphasia will react beneficially to those persons in civilian life who show aphasic symptoms.

CHAPTER XII

EXAMINATION AND CLASSIFICATION

In contrast to the programs described in the service hospitals during World War II, the speech therapist in civilian practice seldom sees the aphasic shortly after the onset of the pathological condition. In many cases, speech therapy is not sought until hope of spontaneous recovery is abandoned. Except in a few large university clinics personnel and time are not available for elaborate testing programs or for full time daily classes for the pupils. In most speech schools and clinics the groups are seldom large enough for homogeneous groupings, which precludes the use of extensive group techniques. The problem of the speech therapist is to retrain the pupils efficiently and economically. It is a slow process at best, and few pupils can afford to pay for extra time consumed by prolonged examinations.

An informal approach should be used in interviewing the aphasic. He must be put at ease in the beginning if full cooperation is to be attained. The examiner must show a friendly interest in him as a person and an understanding recognition of his speech difficulties. A sympathetic but realistic attitude was particularly important with the men whose case histories are reported in

this study. They were repeatedly put through series of tests and psychiatric examinations in the course of their hospitalisation, and several of them reported later that they had come in prepared to resist more testing.

Procedure of Examination:

A skilled examiner with long experience in teaching aphasics talked with each man, and no matter how limited his speech, he was seen volunteering information to the best of his ability. Care and ingenuity were used in interpreting his responses so that he would not be discouraged in his efforts to communicate. In the course of the interview a reasonably accurate diagnosis was made. The general type of residual speech and language ability was demonstrated. It was readily determined whether he could speak in single words only, in phrases, or could maintain his part in a conversation with only an occasional groping for words. The action of his speech muscles was observed to see if they co-ordinated easily for the clear production of words, or whether they were sluggish or showed evidence of partial paralysis. He was asked to imitate some words and tongue and lip movements. A tentative assay and diagnosis of understanding of speech was based on his responses during the interview. An informal test of his ability to name objects and to read, write or copy

was given.

Visual difficulties were best determined by direct questioning and observation. Hemianopsia in the form of blindness of the right half of each visual field and an occasional fleeting blurring of vision were the defects most frequently found.

During the course of the interview the examiner estimated what the subject could not do and formulated a tentative plan of procedure. A more detailed assay and diagnosis was made as training progressed.

Classification:

Precise classification of symptom groups and their relation to the anatomy and function of the brain is important to the medical profession in diagnosis, treatment or operation of brain tumor, disease or hemorrhage. It is necessary in research and study of the various symptoms exhibited in or accompanying aphasia. Precise classification, however, is not of vital importance to the speech therapist in the teaching program. There is so much variation in symptoms and so much overlapping between sensory aphasia, motor aphasia and the other types that the relegation of an individual to any one classification is of questionable value in formulating teaching procedures.

Simon[1] supported this notion in outlining the testing needs of the speech therapist. He stressed that fitting the individual into a classification does not in any way assist in planning measures for rehabilitating the speech and language functions:

> "If we could just forget classification and test on a purely functional basis, we would work more efficiently."

He gave four major items that the teacher must determine: first, what the patient can do; second, what he cannot do, (both of these things in terms of specific tasks in the language fields); third, the things the patient needs most to meet his economic and social demands; fourth, enough case history to know whether the pathology is static or progressive, something of the patient's educational and employment background, and his general type of personality before the onset of the aphasia.[2]

Methods of classification differ widely. Each group of writers, almost each individual, has devised separate classification symptomatologies and differing terminology for the classification. Therefore, any form of nomenclature must be defined to avoid confusion.

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[1] Simon, C. T., Testing Aphasics in the Speech Clinic, Journal Speech Disorders, XI, p. 140, 1946.

[2] Ibid., pp. 139-141.

It is not the purpose of the writer to compare the differing classifications found in the literature nor to offer any new terminology. No single classification is followed, but certain terms are used as labels for convenience in simplifying the descriptions of aphasic manifestations. The following terms are chosen to indicate the areas of disturbances in stating the diagnoses and assessments of the subjects described in later chapters.

Motor Aphasia:

Understanding of speech is apparently normal or not severely defective.

As a general rule speech is scanty in the early stages of recovery and may consist only of emotional expressions, in some instances with profane connotations. Nouns and verbs may return gradually and then "telegram" style sentences, in which only the words essential to the meaning are expressed. "Ball-game, radio" may suffice for, "I listened to the ball-game on the radio." A word or short sentence may occasionally be said spontaneously in an appropriate situation when it cannot be said intentionally. Sometimes spontaneous recovery may continue to the point where virtually normal sentence structure is marred only by the occasional loss of a word needed to complete the thought.

Motor aphasia is characterized by difficulty in articulation. Words may be slurred and the speech difficult to understand even in cases where the sentence structure is not markedly defective. In some cases, words or sentences may be pronounced clearly but they are produced with effort. A loud voice and explosive articulation sometimes accompanies the stage of recovery where the vocabulary is restricted to single words and short phrases. It is as though a violent approach were necessary to bring forth the speech. An attempt to imitate a word or sound is usually unsuccessful although every effort is made to follow the movements of the speaker. Mistakes are usually recognized even though they can seldom be corrected without assistance. The word wanted can usually be selected from a group of spoken words offered, but cannot always be repeated.

Spontaneous recovery does not always progress through all of the stages described above. Cases are seen where improvement stopped early and others where speech and language returned rapidly until they approximated pre-morbid ability. The motor aphasic seldom talks effortlessly, even when his speech approximates that of the average person. His verbal output is noticeably labored because he needs to concentrate on what he is saying and his timing is slower than that of the normal speaker.

Reading and writing show disturbances of varying degrees. (Severe or complete loss of these two abilities is listed separately for convenience of description.)

Sensory Aphasia:

The outstanding characteristic is a severe or complete loss of the ability to understand spoken language.

The temporal pattern of speech may be normal but it is often unintelligible because of confusion in the word sequence of sentences, frequent use of the wrong word, or composed of senseless sound patterns repeated over and over. Sometimes a speech pattern, such as "do do do" is consistent and repeated for every speech attempt, and in some cases the sounds produced vary. In one case seen by the writer, the initial consonants varied in each repetition but the remaining pattern was consistent for that attempt at speech. Another attempt brought out a different basic pattern. Incantational effects resulted similar to the following:

"gumbo, jumbo, lumbo, gumbo, sumbo, rumbo."
"Sickle, pickle, rickle, gickle, mickle."

The attempts at speech usually ended in a profane word uttered in a tone of great disgust. The patient may have realized that he was uttering nonsense or he may have been disgusted with the listener for not understanding him. The sensory aphasic seldom recognizes his mistakes.

Reading and writing are usually severely defective.

Amnesic Aphasia:

Amnesic aphasia is characterised by normal articulation of the majority of words spoken and by speech which is frequently plentiful but rambling because the patient is unable to evoke words as names for objects, conditions or qualities.[3] He is often unable to complete a sentence because he cannot remember the word needed and starts over in an attempt to reword or to describe the thing he cannot name. One patient wanted to say something about San Francisco, but could not remember the name. He said, "where the penitentiary is . . . out in the water." When the name 'San Francisco' was suggested, he nodded and repeated it, but a few minutes later the word was lost again. Recognition of and the ability to repeat the word wanted combined with inability to retain it is typical of amnesic aphasia.

Understanding of spoken language is usually good.

Goldstein[4] stated that disturbances in reading and writing are the exception rather than the rule in this classification, and Weisenburg[5] described reading comprehension as fair. Both reading and writing were impossible for the subject described later as an example of amnesic aphasia.

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[3]Weisenburg, T., McBride, K.E., Aphasia, p. 146.

[4]Goldstein, Kurt, Language and Language Disturbances, p. 246.

[5]Weisenburg, T. McBride, K. E., Aphasia, p. 300.

Agraphia:

Some degree of disturbance in the ability to write is always a part of the aphasic syndrome. Agraphia is generally understood as the loss of the ability to communicate by writing. Goldstein[6] suggested two chief divisions in his description of agraphia which are useful to indicate the extent of the disability.

1. Primary Agraphia

The writing movements are confused or difficult to initiate and letters cannot be formed.

2. Secondary Agraphia

The ability to write letters, or at least copy, is intact and the defect is in relation to the writing of words.

Such disturbances are usually the consequence of the language defects.

The writer has added a third division to identify cases where the writing ability has been retained or has recovered to the extent that remaining defects of occasional confusions in verb tenses, omissions or misspellings do not interfere seriously with sentence meaning or construction. Such cases require a less extensive teaching program in writing than the classification of secondary agraphia would imply.

Where writing is impossible because of paralysis of the hand normally used, a complete diagnosis of the ability

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[6]Goldstein, Kurt, After Effects of Brain-Injuries, pp. 197-204.

to write language cannot be made until some skill has been acquired in the use of the other hand. Such a condition is often found when the examination is made shortly after the onset of the cerebral lesion.

Alexia:

Reading defects which appear as aphasic manifestations vary in character and severity in much the same way as writing and speech. If the general meaning of a sentence or paragraph can be followed but details and exact meanings are missed because an appreciable number of words can not be interpreted, the reading ability is defective or disturbed but it is not lost. Therefore, the cases where partial reading ability is retained are identified by the author as having 'reading disturbances.' The term 'alexia' is used where the reading ability is severely damaged or totally lost so that groups of words in sentence form convey little or no meaning, even though an occasional word may be recognized or associated with an object. The preceding interpretations are extremely broad and each one covers many variations. Nevertheless, they serve to provide some line of demarcation between severe and partial loss of function.

Acalculia:

According to Nielsen[6] "Acalculia, the loss of the ability to calculate, is also aphasia since it is a loss of language function." The writer has noted subjectively two

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[6]Nielsen, J. M., Agnosia, Apraxia, Aphasia, p. 258.

definite types of defects in the use of numbers among aphasic pupils. The most frequent defect is the loss of names for numbers which interferes with computation. Such patients are sometimes able to write the numeral which they cannot name, but they work slowly and find it difficult if not impossible to handle larger numbers or to 'carry' digits in adding, subtracting or multiplying. Therefore the computations are limited to simple forms. They can often write a numeral when its name is dictated and have no difficulty in naming in the counting sequence. Teaching procedures which bring about improved number naming frequently result in greatly increased ability to calculate.

The loss of names for numbers may, however, mask a more severe disturbance of ability in arithmetic. In the second type the arithmetical processes or even the basic number concepts may be lost or damaged. The ability to count or to name a number by counting aloud until it is reached, may be retained or easily learned. The individual may not be able to write a numeral when the name is dictated. A few simple additions of small numbers may be retained, but any problem which cannot be solved by counting is impossible. The steps used in subtracting, multiplying and dividing are lost, and the subject is completely confused when faced with such a problem. It is this type which the writer labels 'acalculia' in diagnosis since teaching of arithmetic is an essential part of the program, whereas the first type, the inability to name numbers, is more closely allied to the

language difficulties in word-finding.

Hemiplegia:

Paralysis of the side of the body contra-lateral to the cerebral lesion accompanies aphasia if the area of the brain which controls the body movements is also damaged.

Hemianopsia:

Loss of sight in one half of the visual field of both eyes may be caused by cerebral lesion. The blindness occurs on the right half of the field in most cases where it accompanies aphasia, since the lesions which affect speech and language are in the left hemisphere in the majority of cases.

The preceding terminology is used by the writer to facilitate general diagnostic headings for case histories and do not replace more detailed descriptions of the various aphasic manifestations.

CHAPTER IV

THERAPEUTIC PRINCIPLES AND PROCEDURES

The adult aphasics whose case histories are presented were taught by the Association Method.[1] The procedures are based on the premise that the visual memory, auditory memory and kinaesiological memory re-inforce each other and that there is an association between them. It is unusual when an aphasic pupil does not show some disturbance in all three fields or when performance in all fields is equally disturbed. Therefore, a method of training which combines practice in reading, writing and motor speech in close relationship is logical and the end results seem to substantiate this viewpoint. The teaching procedures described herein were not designed by the writer. They have been in use for over twenty years and were specifically planned for the rehabilitation of adult aphasics and for the education of aphasic children. While the basic principles are the same for both child and adult, the approach and details of procedures are adapted to the age and background of the pupil.

The individual phonetic elements of speech sounds such 's' and 'aw' in 'saw', are taught individually, but they are not kept in isolation. As each new consonant symbol and associated sound is learned it is combined with various vowels

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[1] McGinnis, M. A., The Association Method for the Diagnosis and Treatment of Congenital Aphasia, Part II, pp. 106-245.

Figure 1 The Northampton Charts of Elementary English Sounds

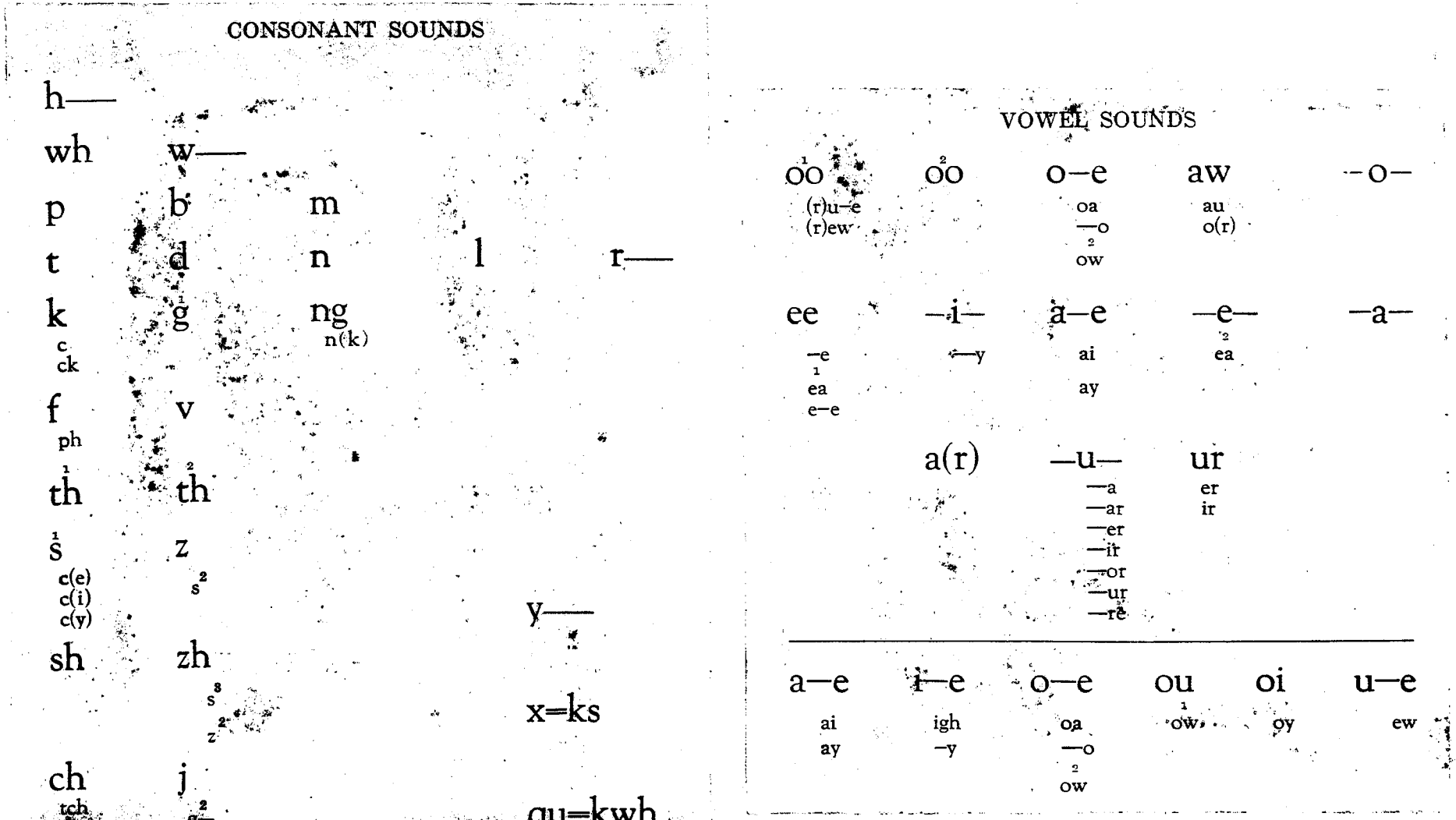

Fig. 1 The Northampton Charts of Elementary English Sounds

in a syllable drill, from which words are built. Each new element or word is read aloud with careful and firm articulation. Each new sound learned is repeated in drills, in words, and in writing until the pupil can say it alone or in sequence, and until he can write it, recognize it and sound its written form. As the pupil progresses the memory for sound sequence and articulation returns with greater ease and there is a more rapid learning of new words. By the time sentences are presented the problem of unfamiliar words can be solved with only a minimum of help from the teacher. As soon as a pupil can read a sentence it is written and read until it can be repeated from memory. Sentence formation and usage is also helped by repeatedly reading aloud with good articulation. The aphasic is always encouraged to use as much as possible what speech he has. If sentence structure is defective, he is helped to put his thoughts into sentence form.

Description of Phonetic System:

A more detailed description of the way in which the speech sounds and syllable drills are used will be helpful in understanding the method. The Northampton[2] phonetic charts are the basis for the elements taught since they use no unfamiliar symbols and can be applied directly to reading, writing and spelling. The charts are estimated to be accurate for approximately ninety per cent of the English words in everyday

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[2]Yale, C. A., Formation and Development of Elementary English Sounds, pp. 10-11.

usage. They consist of two charts, one composed of consonants and the other vowels. Letters or combinations of letters as they occur in spelling form the sound symbols. Therefore, a direct association is made between the letters as they appear in written language and the sounds they represent without digression into unfamiliar phonetic markings or hieroglyphic-like symbols.

The English alphabet has twenty-six letters while English speech requires the use of more than forty different sounds. In the written form of the language the sounds not represented in the alphabet are indicated by certain combinations of letters or by the position of the letter in the word. For instance, the letter 'a' is associated with different sounds which are indicated by combinations such as 'aw' as in 'saw', by 'ai' as in 'tail'; it is sounded as 'ah' when followed by 'r' as in 'park' and becomes a short 'a' when it appears between two consonants as in 'sat'.

The combinations chosen to represent specific sounds on the Northampton charts were based on the frequency of their appearance in words of everyday usage. Whenever a particular letter or combination was invariably pronounced in a certain way, it was used as the primary symbol for that pronunciation. In cases where more than one letter or combination were consistently pronounced alike, or where there was no spelling for the sound which was without exception, that spelling which appeared most frequently was given the primary position

and the others grouped below it as secondary spellings.

The following examples indicate the specific applications of the phonetic symbols used in the charts:

1. The use of the spelling "o-e" to represent the long "ō", as in "bone", does have some exceptions such as "some," "come," "love," and "shove." The exceptions, however, are small in number compared to the list of words in which the spelling is phonetic. Therefore, the teaching of ten or twelve words can establish the principle of the pronunciation of many more words and only the exceptions need be memorized for recognition.

2. The primary spelling in the group is "o-e" the same construction is used for "ā", ("a-e" as in "pale"), and for "ī" ("i-e" as in "ice"). The dash indicates that a consonant stands between the two letters in the word. The silent "e" is thereby retained and is recognized in reading as the clue to the pronunciation of the preceding vowel. The short vowels are differentiated by their position between two consonants and the omission of the "e." For instance, "-a-" as in "sat," "i-" as in "sit" and "-e-" as "set." The following lists contrast these sounds:

o-e		-o-
note	not	
rote	rot	

a-e	hate	hat	-a-
	cape	cap	
	mane	man	
i-e	pine	pin	-i-
	tine	tin	
	pipe	pip	

3. The combination "ow" carries the number two above it. The number indicates that the letters "ow" have another more common pronunciation ("ow" as in "cow") which is marked with the number one.

4. The dash "-e" shows that this spelling is pronounced as "ō" when it occupies the final position in the word as in:

no
go
hello

5. All possible secondary spellings are not included. Only those which represent large classes of words are used.

6. The location of the letters on the charts are indicative of relationships in the articulation of the sounds they represent. On the consonant chart, the left-hand column represents the breath consonants, the next column to the right lists the voiced forms requiring the same positions of the speech musculature. The third column is made up of the three nasal elements. The consonants are placed horizontally according to similarity of motor production.
On the vowel chart, the horizontal position is also

classification of formation. The top line contains the back-round vowels, the second row the front vowels, the third row the unrounded vowels, "a(r)", "-u" and "ur, ir, er," and the bottom row groups the diphthongs. Two diphthongs, "a-e" and "e-e" are listed twice, first in the scale to which their component parts belong and secondly with the other diphthongs. The vowels are placed in the row according to formation with the highest tongue position on the left and the lowest on the right.

Syllable Drills and Word-Building:

Lip and tongue exercises precede all speech work. They are particularly important when the speech muscles are affected by hemiplegia and when there is motor aphasia. Since the goal of the whole teaching procedure is association of visual, auditory and kinaesthetic impressions, the exercises are an essential part of the training. When a sound is to be taught, an exercise involving the specific movements needed is stressed to give practice in the kinaesiology without the added problem of coordinating voice and breath. When voice or breath is coordinated and the sound produced it is written in a special progress book on a front page reserved as an index of the sounds taught.

The only sounds taught alone are the first few vowels and perhaps two or three consonants. An index page is made for the consonants, and another for the vowels. The letters

are placed according to their positions on the chart, although they are not necessarily taught in that order. When the index pages are completed they reproduce the entire chart and may be used later as a reference if a reminder is necessary in reading or writing practice.

The first vowels are the long vowels, "a-e," "ee," "o-e" "i-e," "oo," "aw" and "a(r)" as they are more easily produced and better retained than the short ones. If the motor movements or the capacity of retention is not severely disturbed the first group of sounds and their written forms may be taught in one lesson. In severe cases, the beginning steps must be repeated over and over again until a memory span for the movement and association for each sound becomes fixed.

All writing in the notebook is done with crayon in a heavy stroke "to suggest a firmness of vocalization."[3] Each letter must be clearly written to show its formation. The crayon must be of good quality to produce clear, strong colors. The breadth of the stroke and the strong color contrast give a poster-like quality to the crayon writing which seems to make a more vivid mental impression than the narrow lines and thin tones of the colored or lead pencil.

The syllable drill is composed of one consonant with changes of accompanying vowels. For example: ne-e, ni-e, na-e, etc. The arrangement is important and is planned to

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[3]McGinnis, M. A. "The Association Method," Part II, p. 160.

give a clear cut pattern to the page. Each syllable, consisting of a consonant and a vowel, is written in cursive script three times across the page with a definite spacing between each one, in this fashion:

no-e noa no

The same vowel is repeated on the horizontal plane but secondary spellings may be used in the repetitions, as above. The next row is spaced about two lines below and a different vowel combined with the same consonant.

no-e	noa	no
na-e	nai	nay
nee	nea	ne-e
ni-e	nigh	ni-e

The consonant is always written in one color and the vowel in another, so that each page has a two color scheme. Four vowels to a drill may be sufficient at first, but as work progresses the succeeding drills are lengthened by the addition of new vowels.

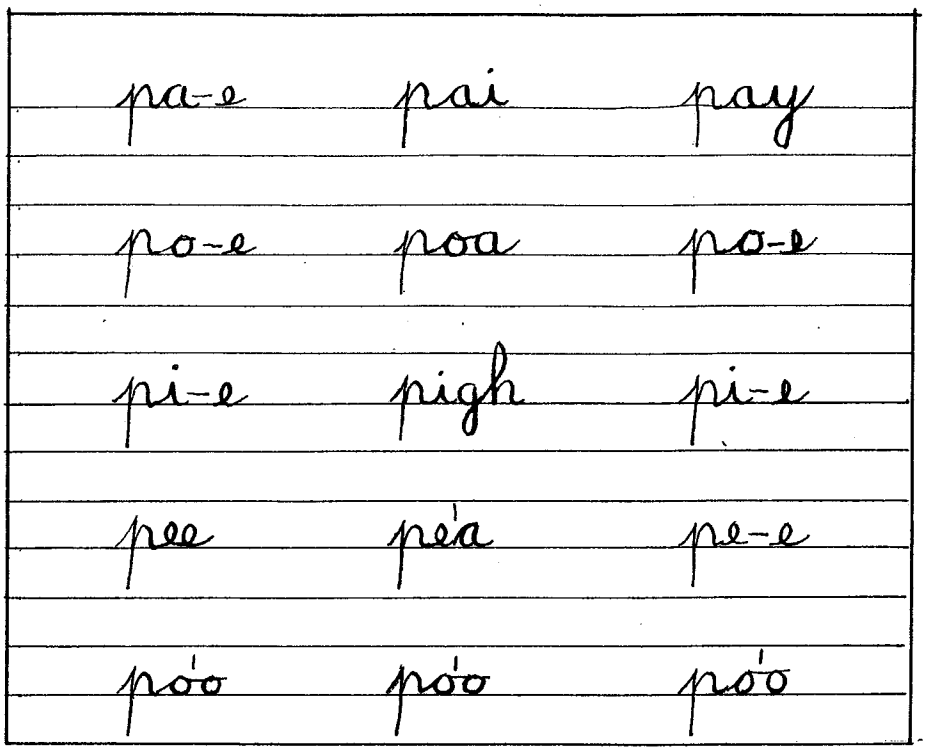
The two color arrangement has a definite purpose. As each syllable is read the pupil points to a letter and says the sound for it with good articulation and a full voice, and moves his fingers to the next sound and says it. The change in color indicates the division in articulation and is a guide toward later more accurate word recognition by a recognition of its parts. The stop between each sound gives time for the correct pronunciation to be anticipated and also strengthens

the visual association of the letter form with its motor production. The teacher may help with the first syllable in the line, but the other two should be repeated from memory, if possible. After a little practice initial prompting is not needed. When individual sounds can be produced easily, the pupil reads the line of syllables twice, first by separate sounds as "n o-e n oa n o," then again as syllables with the sounds smoothly combined so that the oral pattern is "no no no"

A confident and strong voice with exact positions and movements in articulation are demanded for each sound or sound sequence. If the associations between the written symbol, the auditory pattern and the motor production are made strong and interrelated by conscious practice at the time they are taught, they will be retained and recall will more nearly approach the normal. The demand for precision holds the pupil's attention to the task at hand and requires alertness. A weak voice and indefinite articulation not only fail to assist recall, but can make the drills boring and monotonous.

The words which accompany each drill are never given on the same page nor on the opposite page. The page must be turned and the memory of the sounds retained for the word reading. The use of two pages also avoids a cluttered or crowded appearance which could make the task seem too great or cause confusion. The first words given are one syllable

Figure 2 Typical Syllable and Word Drill



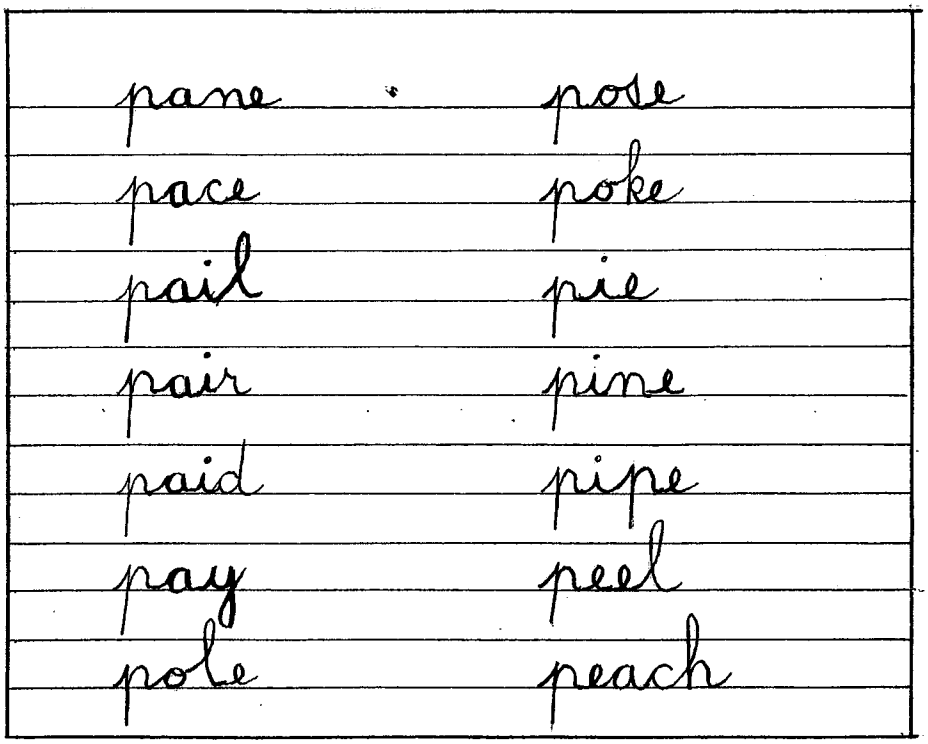


Fig. 2 Typical Syllable and Word Drill

words which can be formed by the addition of a single consonant to a syllable from the preceding drill page. The colors used for the words match those of the drill they accompany. The additional consonant is the same color as the initial consonant. Figure II shows the order of the word lists, at least three words should be built from each syllable form, if possible. Thus the syllables are not in any sense nonsense syllables, but are the root forms of words and have a definite place in reading, writing and speech. The words used must be within the everyday vocabulary to be expected of the individual pupil's background and education. If understanding is defective they must be nouns which can be illustrated by a picture or an object.

In severe loss of understanding the word is written under a picture of the object in the notebook so that an association is formed. Practice is also given in associating the words with mounted pictures of the objects. When the word can be said from memory after reading the written form, the pupil gives the name when the picture alone is shown. Next he chooses the picture from a group when he hears the word. Then he is shown the picture and copies the word or writes it from memory. In all cases the word is read repeatedly until the motor speech memory is established and articulation of the word is required without the written form.

The number of words built for practice of each new consonant may be limited in the first few lessons by lack of

developed consonants for word endings. Many adult aphasics, however, are able to recognize or imitate enough consonants so that the word choice is not severely restricted. Where there is severe loss of letter recognition and defects of production, consonants cannot be used until they have been taught. Therefore, the order of teaching of the consonants is dictated by their value as word endings as well as by difficulty of production. Subject L. F. made word associations of a type which made it necessary to postpone word building until the direct association of sound and letter form was strengthened. As work progresses, previously taught consonants are being reinforced by their use as word endings. It is practical to teach consonants which are difficult for the pupil as early as possible, to take advantage of the opportunities for repetition in later word lists. The vowels are repeated in every drill as well as being constantly used in words.

Later, two syllable words are used with consonants in medial positions. No attempt is made to cover every consonant in initial, medial and final positions. All are taught in the initial position, with the exception of the "ing" and "x" and by the very nature of language will appear in the other positions in the course of practice.

Where articulation is disturbed the consonant combinations such as "cl," "pl," "st," "str," etc. are practiced in drill form. Three colors are used, one for each consonant

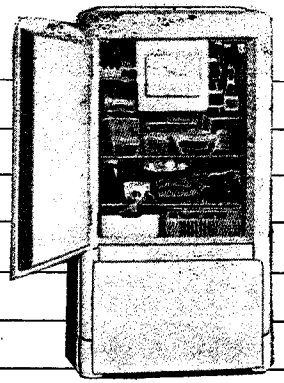
and the third for the vowel. The sounds are said without blending or modification. A word such as "black" may have to be said as "b...lack" until the motor pattern is learned and the speech muscles move easily through the positions. Repeated practice improves the coordinations until the words can be said smoothly and clearly. Premature blending or smoothing of the sounds usually defeats the purpose of the practice and the original defects re-appear. The modifications of sounds made in normal, fluent speech usually appear without specific training after the accuracy of movements of production become easy.

It might be well to stress at this point that the purpose of this method of teaching is not to have the pupil memorize every word which he is likely to meet in reading or speech. On the other hand, every step is planned to give him a technique for reading and learning words which he does not immediately recognize. He is also being trained in sound discrimination for recognition of words he hears and for recalling and saying words in speech.

Sentences:

Where the reading disability is severe or language consists of single words or phrases, the first sentences are written in a special note-book and may start with a form of picture description. On the left-hand page is pasted a picture cut from a magazine or advertisement. The names of the objects in the picture are listed below and practiced for

Figure 3 Vocabulary and Repetitious Sentences



ice-box	lettuce
meat	fruit
milk	cheese
soda	catsup
butter	bacon

The meat is in the ice-box.
The fruit is in the ice-box.
The catsup is in the ice-box.
The soda is in the ice-box.
The lettuce is in the ice-box.
The cheese is in the ice-box.
The bacon is in the ice-box.

Fig. 3 Vocabulary and Repetitious Sentences

reading and understanding. Then sentences are written on the opposite page. A picture of an opened and well stocked refrigerator is an excellent beginning picture because it allowes for a repetition of the same sentence form with only a single word change. For example:

The cheese is in the ice-box.
The milk is in the ice-box.
The meat is in the ice-box.

The words are spaced so that each sentence requires but one line, and identical words fall directly under each other. The whole effect is an orderly and well spaced page. Colored pencils, if the colors are vivid and the stroke form, may be used here. A contrasting color is used to emphasize words or word forms which cause difficulty, usually the verbs or small words. The use of colors should be consistent throughout the page, and should not be used for a verb in one sentence and a noun in the next. The purpose of the color contrast is to call attention to a similarity or a difference which is consistent. In the examples used above, it is most effective to use the contrasting color on the words "is in" as these are often the most difficult for the aphasic.

Exact repetition of sentence form must not be carried to the point where it becomes monotonous, or until repetition is automatic. Overuse can develop a perseveration of a pattern which causes difficulty in shifting to a new construction. Ten or twelve repetitions of the one form will develop a pattern of motor speech for that form which is then

broken up by the introduction of a change such as "is on." The picture of a room and sentences such as the following illustrate the change of wording.

The lamp is on the table.
The book is on the desk.
The pen is on the desk.

The introduction of a change in the pattern after the motor speech pattern is learned, but before it is automatic, induces cerebration and is essential to training in the flexibility required before a printed book can be read. The sentences gradually develop story form with the changes in construction progressively increasing in frequency and difficulty.

Sentences are kept simple and associated with pictures until the reading can be performed with comparative ease. Whenever a word is not read easily it is said sound by sound and then blended into the whole. In most cases when the pupil can say the word clearly it has meaning for him. If it does not have meaning, the teacher says the word. The production by some one else is often recognized when his own production is not. If this is not successful the meaning should be illustrated by use or picture. Throughout the teaching the pupil is encouraged to have no embarrassment about a failure to understand words or to ask for assistance. Such an attitude can be developed best by the teacher's actions and personality, rather than by talking about it.

The index pages of the original drill book are kept at hand during the reading so that they may be referred to.

if there is any doubt about the recognition of a letter, or the teacher may show the sound to be used if a word is not phonetic in its spelling. In the word "candle" the pupil might hesitate between the "s" or "k" sound for the initial "c." Indication of its position under the "k" would give the pronunciation immediately without the distraction of an oral explanation. The association of the sound with the word is reinforced more than it would be by imitation.

When there is language disturbance, the sentences are memorized until they can be given in answer to a question. Immediate recall only can be expected in the early stages of memory training. Questioning is used in all cases, but where language is good the memorization is not necessary. The picture description work is a source of many new words for both reading and language training. When the pupil is able to read and understand most new words without having to refer to the picture, the sentence work takes the form of experience stories similar to those used with children. Events of the pupil's everyday life are written in sentence form and learned for language. The facts and ideas are presented by the pupil, prompted by questions of the teacher. The information obtained is put into sentences in the book and read and learned. The same sentences can also be copied outside of the lesson period for writing practice and reinforcement of memory. The pupil must be able to read and understand any material to be copied if it is to have more than exercise value. The language used is suitable to the background and

education of the individual pupil and should be usable beyond the actual lesson. The number of sentences depends on the learning ability of the individual. Two sentences may be a task for a severe case, but if he learns these he will be encouraged to try more. The number of sentences may be increased as the pupil's memory improves, thus avoiding the discouragement which would result from too great a demand at the beginning. In contrast to the first sentence memory work, the experience stories should be learned well enough to be used to answer questions at the next lesson period with only a minimum of prompting, or for writing from dictation.

Reading of Printed Material:

When the problem is one of reading without severe language difficulty, the step of story writing need not be carried on long before a transfer is made to the printed page. Unfortunately, there are no attractive or suitable books available for the adult aphasic who has reached a primer or first grade level of reading skill. We are forced to use children's readers. The short sentences and the wide spacing between the lines of print are especially valuable if there is difficulty in understanding or in vision. Most of the pupils will accept the elementary material. Once in a while we have had to prove our point by allowing a pupil to attempt a more difficult book, but after a short trial he is usually ready and willing to accept the simpler

material as a necessary step in his relearning. On the other hand, some pupils lack confidence in their ability to read more complex language and need to be more or less thrust into advancing.

There is seldom any difficulty in transferring from the cursive script to print. Where there is any confusion the index of sounds is at hand and the corresponding script letter is pointed out.

All reading is oral in the lesson periods although the pupil is encouraged to try to read silently whatever he can. Oral reading affords practice in articulation and also allows the teacher to see where and what reading difficulties occur. A clear articulation is demanded and all words endings are definitely sounded. Accuracy of articulation in oral reading not only improves the reading ability but has shown its value in many cases in overcoming slurred articulation and dropped endings in speech.

If a pupil has difficulty with a word he is apt to lose the meaning of the sentence, in this case he repeats the sentence until he can read it smoothly and it has meaning for him. In cases where the pupil may have difficulty with several words in a sentence it is sometimes better for the teacher to read the sentence aloud to him after he has completed his reading of it, than to have him meet the same obstacles three or four times. Such assistance should be given only when the pupil does not grasp the meaning of the sentence. After he has acquired some skill at reading,

he is questioned about the content at intervals.

Accuracy is stressed in the earlier stages and when it is acquired, fluency usually follows. The oral sounding process is resorted to less often, more words are read as a whole, and new words are attacked with confidence and skill. The pupil is taught to analyse polysyllabic words and is given special practice in dividing them into syllables for recognition, memory and writing.

Writing:

When paralysis accompanies the aphasia the pupil has to learn to write with the left hand. The change of handedness is made only because of the physical impossibility of writing with the paralysed hand. The old-fashioned writing exercises, circles and running circles, are valuable in learning control of line and direction of movement. Practice on the blackboard gives a freer swing to the movements and should be given if the pupil is able to stand. If a blackboard is not feasible, the writing should be practiced on paper with a soft pencil and a minimum of restriction to lines. A wooden or heavy composition board with a large clip riveted at the top, which can be found in any business supply house, is almost essential for one-handed writing. Paper clipped on the board is held steady even when the writing movements are uneven and awkward.

As soon as the pupil can form running circles moderately well, the script "e" can be practiced. A change to "l"

follows easily, then "o," "a," "d" and "g." A pattern can be written on a sheet of lined paper, the pupil's ability to make the correct movements checked, and he can continue the practice outside of the lesson period. It is not always necessary to give special practice on all of the letters. Sometimes, the only problem is learning to control the movements of the left hand, and the pupil can transfer to words in a short time. It is important for a pupil to learn to write his name as early as possible. In many cases, he can write it from memory as soon as he can guide his left hand. In other cases, even words as familiar as his own name must be relearned. A sample written at the top of a page can serve as a guide for practice.

Writing practice is carried along with the syllable drills and word building, as described in the preceding pages. Sentences serve as material for writing practice while they are being learned. If the procedures are properly followed the writing progress should parallel the improvement in reading and speech. There will be variations in individual cases, of course, but in general the statement will hold true.

After reading of printed material has begun, special assignments for writing practice may be needed. The assignments must be fitted to the ability of the individual and designed to strengthen his confidence and independence in writing words and sentences. The principle of association

of sound and symbol holds true in writing as in reading. The pupil is taught from the beginning to sound out each word as he writes the letters. The oral analysis is gradually eliminated as his memory for words improves and is resorted to only when he is uncertain of his spelling. It is true that there are many unphonetic words which appear frequently in even the simplest sentences, but the ones most needed have been practiced often in the picture descriptions and experience stories and should be fairly well learned. The pupil is told to write the word according to the sounds in it if he is uncertain of the spelling in unsupervised writing, and that the word will be corrected and practiced in the lesson. Many times a reading over of what he has written will stimulate recall of the correct spelling.

Where speech is severely restricted by the inability to formulate sentences, reading will probably progress faster than speech or writing. Independent sentence writing will of necessity be limited to sentences which he can say. Assuming that the writing of single words has reached a point where they cause no extreme difficulty, and that the sentences of the written stories were practiced until each one can be written from memory; the next exercise should consist of writing simple sentences from dictation. Homework assignments can be made by the way of pictures in the following ways:

1. A picture of a room given to the pupil. The questions,

"Where is the _____?"
"Where are the _____?"

are written at the top of a piece of paper and he is told to write the answers using the names of the various objects in the picture. One or two of the sentences should be written in the lesson period to check the pupil's understanding and performance. If he is confused a skeleton sentence can be written for him,

"The _____{is / are} on the _____."

2. A picture of a basket of fruit or something which would require the use of "is in" might be another assignment.
3. A picture of a room or something which embodies a variety of objects will give practice in writing answers to, "What color is the _____?" or "How many _____ are there?"
4. Groups of pictures which illustrate various actions give practice in writing verbs. "What is the _____ doing?"

"The boy is running."
"The girl is painting."
"The man is reading."

In some cases, where sentance construction is not markedly defective in speech, a few such assignments may give the pupil enough confidence to attempt more versatile sentence constructions, and writing may progress rapidly. Subject R. K.

illustrates an example of such improvement.

Where writing ability is not severely defective and spoken sentences are well constructed, writing assignments may take the form of short compositions, reviews of articles read or synopses of movies or radio programs. The papers are written at home and brought in for correction and discussion in class. They can serve as both speech and writing practice.

Arithmetic:

Arithmetic is best taught after language, reading and writing are fairly well established. In many cases the number concepts are intact or are not seriously damaged but the ability to name numbers is defective. After the ability to read, write and say the names is recovered the problem is reduced to associating name and numeral. Where number concepts are lost or damaged there is a double problem, and the chances for successful relearning are increased when the deficiencies of reading and number naming are overcome before the second problem of number concepts is approached. Reading is an essential part of arithmetic in all levels from the first learning of numbers to the understanding of complicated word problems, and the more skillful it is the less the pupil is distracted from his concentration on the handling of numbers.

The techniques used in the reteaching of arithmetic where the memory of arithmetical processes was lost are

described in the history of subject R. K.

Summary:

There is a great deal more to retraining an aphasic than following the steps of the specific method. Drill is usually necessary but it must not be monotonous, it must have enough action and purpose so that the pupil is kept alert and attentive. Any drill must have a swing, a meaning and a goal. The pupil must be made to feel that the retraining of his speech, reading or writing is as important to the teacher as it is to him. It is imperative that he feel confidence in his teacher's ability to guide him as rapidly as possible.

The demand for clear articulation and a strong well-pitched voice builds confidence and attention. Speed is not stressed before accuracy of recognition and production have been attained. It must always be kept in mind that a successful performance in the classroom is not the goal of the training, it is only a means to the goal, which is successful performance in everyday life. There is no attempt to teach diction, as such, or to change a pupil's grammar. The majority of the pupils will never need to read a college text book but they will want to read newspapers and magazines. They are not planning to give lectures. They want to speak intelligibly and easily to their families and friends, and, most of all, they want to be able to do some sort of remunerative work. It is the responsibility of the teacher to bring

them as close to their premorbid level as possible. There must be no promise of miracles or perfection; these are adults and are quick to recognise encouragement which has no basis in reality.

No method of teaching can be written step by step on paper without losing some of its life and character. The personality and ability of each teacher will add to or detract from the method. No method can be followed slavishly in teaching any subject, and this is doubly true in retraining the aphasic. Each case presents an individual problem, therefore only an outline of the basic foundation can be given here. Ingenuity and skill are often required in varying or modifying additional practice. All practice must have direct value and application, and should be for teaching rather than for exploring wishfully some supposedly hidden reservoid of information or speech. If there is such a reservoir the teaching itself will discover it.

The procedures described have followed the most important steps for teaching an aphasic who has severe difficulty in reading, writing and speech. The language abilities are affected by so many factors that the actual techniques will be described in several cases in later chapters. Because of the individual differences in aphasics the reading abilities cover a wide range and the first books used vary in reading level with each case. In practically all cases the phonetics must be taught either for motor speech defects or for reading.

The only exceptions are a few cases where reading is virtually intact and the speech shows evidence of spontaneous recovery. In such cases some of the sounds are given initially and only those sounds causing special difficulties are given systematic drill. Sentences are introduced earlier and oral reading may be used early in the training as a vehicle for speech practice.

PART II

APPLICATION OF TEACHING PRINCIPLES TO SPECIFIC SUBJECTS

CHAPTER V

SELECTION OF SUBJECTS

Four subjects were chosen from a larger group as demonstrating either different aphasic symptom groups or requiring deviations in the basic teaching techniques in some aspects of the training.

Each history is reported in detail, presenting as much diagnostic, social and educational background as is available and outlining training procedures in each case. The subjects were selected from those taught in the regular clinical program of the Speech Correction Department of the Central Institute for the Deaf under the auspices of the Veteran's Administration. Most of the program was carried out in private lessons with occasional informal group meetings.

The entire group represented a special challenge in that they were all beyond the normal period of spontaneous recovery when the training reported here was begun. It was felt, therefore, that additional progress must be largely the result of the teaching program.

Some of the men who were enrolled for training came from hospitals with organized speech training, but others had help only from untrained workers or other patients. Many different stages of recovery ~~where aphasic manifestations in~~

GROUPS were represented in each group.

Speech:

Many variations of aphasic symptoms were exhibited by the group from which the subjects were chosen. Some of the men could not express their thoughts in words, neither could they imitate a word pattern or single sounds. A few words constituted the entire vocabulary of some members of the group, others could use a limited number of whole or partial sentences with frequent loss of the word needed to complete the thought. A few talked almost normally except for occasional difficulty in word finding, but were able to do little or no reading or writing. Some of the men with very limited language pronounced their words clearly while others who used almost normal sentence constructions slurred or drawled their articulation. There are examples of most of these disturbances in the subjects chosen for report.

Reading:

Some of the men had lost all of their ability to read. Some could read but it was a laborious process and far below their ability prior to the injury. Even those who read well enough to understand the general subject matter of a short article were handicapped by difficulty in the recognition of small words such as "if," "of," "is," and "the" which prevented complete comprehension. A few could match the written word to the correct picture but could not identify the word if presented alone.

Writing:

All but one of the men could copy the written word, and all but one or two could transpose printed words into cursive script. Some copied well even when the words they copied had no meaning for them. It was found, however, that every man had some experience in copying during hospitalisation, even where no speech training had been offered. Only one could not write his name. Hemiplegia had forced many of them to learn to use the left hand, and some of them still wrote or copied very slowly. A few of the men could write short sentences spontaneously from dictation but none had regained their premorbid ability.

Understanding of Speech:

Only one of the men showed enough loss of understanding of speech at the time of the interview to be classified as sensory aphasia. Several others reported that they had difficulty in understanding what was said to them shortly after their injury. Most of the group showed some confusion of meaning in interpretation of rapid speech and a few could not understand specific language constructions.

PSYCHOLOGICAL PROBLEMS

The psychological aspects of aphasia differed with each case. Since the men in the group were enrolled for training from one to three years after their injuries, the initial shock of realising that they could not talk or read

and their adjustment to the condition had been made. Association with others with similar injuries and the activities in the army hospitals were beneficial in most cases. One man said that he could always look around and see someone whom he felt was in worse condition than he, and feel that he wasn't so "bad off" after all. Many of the group went through a period of readjustment when they left the hospital where they had been living in a world of the handicapped and found themselves conspicuous among the non-handicapped. Two men faced divorce by girls they had married when in uniform and a third found his engagement broken. Those whose wives and families accepted them with understanding and common sense made the adjustment more quickly. It was also helpful when the gap between discharge and enrollment for further training was not prolonged.

Eisenson[1] concluded, subjectively, that the individual who was withdrawn before the head injury made slower progress and needed more psychological support than the one who had been of the extrovert type. He felt that the second type appeared to make rapid improvement because they took chances more often and were less embarrassed by their errors. The writer is in agreement with the conclusion but feels that there are notable exceptions in the withdrawn type who is a quiet but presistent worker, and the extrovert type who shows more

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[1]Eisenson, Jon, "Prognostic Factors Related to Language Rehabilitation in Aphasic Patients," Journal Speech and Hearing Disorders, XIV, iii, p. 262-264.

interest in tricks to conceal his deficiencies than in overcoming them.

Most of the men accepted the fact that they could not talk, but believed that they could improve with training. A few, who made little improvement either by spontaneous recovery or as a result of the teaching program during the convalescent period in the hospital, were despondent and doubtful that their speech could be improved. According to reports by the families of the patients there was no observable change in personality subsequent to the injury other than the hopeless attitude toward regaining their speech.

No promises were made, but the techniques used showed the pupil he could improve. The purpose of the procedures was explained so that he could see some reason for the routine he was given. The teacher had to make careful analysis so that the program would include the necessary approach to an especially difficult problem. The wrong analysis and a subsequent demand beyond the ability of the pupil would create despondency. Planned preparation for each new learning problem, a readiness on the part of the teacher to listen to personal problems and give informal counseling and occasional group meetings were the forms of common sense psychology used.

In civilian life in a large city it was impossible to have planned recreation such as that arranged in many of the service hospital clinics. Most of the men lived at home and their own family life did much to replace social meetings.

SUBJECTS SELECTED FOR REPORT

Each subject is listed below with an outline of the factors considered in his selection:

R. C. Moderate motor aphasia, some reading disturbances, some writing difficulties, and interference with arithmetic by language disabilities rather than loss of arithmetical concepts. He had some speech training and made partial recovery before entrance and illustrated the amount of additional progress sometimes possible under continued and persistent training.

R. K. Moderate motor aphasia, some reading disturbances, agraphia which improved rapidly under training, and a loss of arithmetical concepts which improved with training. There had been partial recovery of speech and reading with little or no training before the teaching herein reported began. R. K. was chosen to illustrate specific procedures used to retrain him in the use of arithmetic.

E. H. Severe motor aphasia, alexia, agraphia with some disorders of understanding. Speech lessons during hospitalization had improved understanding, added some words to his vocabulary and taught him to form the written letters with his left hand. His wife had been told he had reached a plateau of learning. Although this subject was despondent about his chances of improvement when he started further training, he

made excellent progress in reading, writing and speech. Even though his training was discontinued before he had reached the extent of his learning, ability, he seemed worthy of report because of the amount of progress made and his reaction to it.

L. F. Amnesic aphasia accompanied by alexia, agraphia, and acalculia. He had some speech work, probably with an untrained worker, during hospitalization and learned to name a few objects, and to copy a written word. Speech was voluble and fluent but rambling because of his attempts to describe objects which he could not name. He showed interesting associations as reaction to some printed words. He was a cheerful, willing but difficult pupil because of his short memory span for the written symbol and his indirect associations. Although his training was not completed at the time of writing, it was felt that his case was interesting enough to warrant inclusion even though a final summary of progress could not be made.

CHAPTER VI

SUBJECTS AND SPECIFIC PROCEDURES

SUBJECT R. C.

Classification: Moderate motor aphasia complicated by disturbances in reading and writing and accompanied by right hemiplegia. Traumatic origin

White, male, aged 25. Right-handed.

R. C. was twenty-five years old when he began his speech training at Central Institute for the Deaf in January, 1946. He had been a bombardier in the Army Air Force with the rank of second lieutenant. He presented a moderate motor aphasia and a right hemiplegia as the result of a head injury in the left fronto-parietal region suffered in a crash landing in England when his plane ran out of gas returning from a mission over Germany in November, 1943. R. C. was unconscious for twenty-three days after the crash and when he awakened found that he could not speak although he "knew what people were talking about." He underwent two head operations during his first five weeks in the hospital to remove abcesses which formed within the injured area. Shortly after the accident he could not name the months and had difficulty recalling the names of common objects. The ability to speak and to name objects gradually returned, but he had considerable difficulty in speaking. By April, 1944 he

could talk a little but could not read or write, according to his own report.

On May twenty-third, 1944, another head operation was performed and a tantulum plate was inserted. R. C. had several convulsive seizures between October, 1944 and November, 1946, but his aphasia and his hemiplegia both improved generally. There was only one recurrence of the seizures between November, 1946 and June, 1949, when he was dismissed from Central Institute for the Deaf.

R. C. received daily speech lessons during his last four months of hospitalisation and he improved in speech, reading and writing. He had regular treatments in physiotherapy and when he was discharged from the hospital in March, 1945, he walked with a light ankle brace and could move the right arm to some extent. His general physical condition was good.

Although R. C.'s recovery was enough to enable him to communicate thoughts and ideas, he could not join in social situations without strain and discomfort because his speech was halting and slurred; nor could he qualify for employment. After several months at home he felt that he could not improve without further speech training and appealed to the Veteran's Administration for arrangements for lessons.

Social and Educational Background:

When R. C. was a boy his family moved from a small town to the city where they had a difficult time financially.

In high school he was ashamed of his poor clothes and would not join in the social activities because he could not pay his share of the expenses. After graduation from high school R. C. went to a business college. He later became a city dispatcher for a large trucking company and earned a good salary. He took his entertainment very seriously and made a point of "going with the crowd." When he was twenty-two years old he entered military service.

After R. C. returned from the hospital he felt that he could not rejoin the "crowd" again because he could no longer do the things they enjoyed. He saw a few of the men he had known and played cards with them occasionally. In the eight months before he entered Central Institute for the Deaf he spent most of his time at home, with the radio as his chief source of entertainment.

R. C. was very serious in his approach to his speech training and something of a perfectionist. Sometimes he would be moody and impatient of his progress, but on the whole he was cooperative and alert. His sense of humor was often good, but he was more interested in facts and information than in social conversation. He was inclined to question a procedure if he did not see the cause for it immediately but was not stubborn in his attitude. He was intelligent and analytical in his adjustment to his paralysis and aphasia although there were times when he felt he could improve no further. However, he would cooperate well, even

when sceptical of success.

APHASIC MANIFESTATIONS AT THE BEGINNING OF TRAINING

Speech and Understanding:

When R. C. enrolled for training his speech was drawled and halting, his articulation somewhat slurred and there was frequent omission of final consonants with occasional loss of the word wanted to express his thought. He said that he sounded "like a drunk." In spite of these defects, his conversation was intelligible and he had no major difficulty in sentence construction.

Understanding showed no disturbance, he followed a conversation easily and consistently gave appropriate replies.

Reading:

R. C. could read silently and follow the general theme of the subject matter but he complained that it was slow and he often lost the thread of the thought. In oral reading the articulation was sloppy and he had difficulty with words such as "the," "there," "had," "do," "on," "he" and "with" more often than with longer words. He tended to guess at the general meaning of the sentence to help him supply the words which eluded him and to substitute words which fitted the assumed meaning. Unfortunately, the words he guessed at were often essential to the correct interpretation.

Writing:

As a result of practice since his injury R. C. could write with his left hand. He had been right-handed before. He could write full sentences and the majority of the words were correctly spelled. He sometimes confused verb tenses, particularly "was" and "were" and "have," and "had," endings such as the "s" on plurals, "ly" and "ed" were frequently omitted. The words which were difficult to read were also troublesome in writing.

Arithmetic:

R. C. could count change, tell time and do simple computations. He understood number concepts but was often at a loss for the name of a number, which slowed and limited his calculations. He could recall the number name if given time but the process was very slow. The loss of skill worried him since he had excelled in all forms of arithmetic before his injury.

LESSON PROGRAM AND LENGTH OF TRAINING

R. C. was enrolled at Central Institute for the Deaf for three and one-half years, from January, 1946, until June 15, 1949. During that period a total of approximately eight months was consumed by summer and Christmas vacations. R. C. was regular in his attendance and missed no more than ten or twelve lessons because of colds or other minor illnesses throughout the entire three and one-half years.

During the first five months of their training R. C. and R. K. were taught together in two two-hour lessons a week. Then R. K. entered the hospital for six weeks and R. C. continued alone in two one-hour lessons a week. After R. K. returned it was decided to change the program to one two-hour lesson with R. K. and one one-hour individual lesson a week so that each subject could have specific teaching in writing and arithmetic. In the fall of 1947 arrangements were made with the Veteran's Administration to give each veteran three lessons a week. The new schedule for R. C. consisted of one reading lesson with R. K. and two individual lessons each week until June, 1948. R. C. had two lessons a week for the rest of his training to adjust to his employment schedule.

TEACHING PROCEDURES

Reading and Speech:

R. C. and subject R. K., who entered at the same time, were taught together in the reading program. Although both of them could read to some extent, there was still enough difficulty to require phonetic training. Without a tool to give independent approach to words which eluded them, their further progress was limited. Therefore, they were trained in the sounds, syllable drills and word building. They learned these with comparative ease and it was possible to start reading from print while the final sounds

were still being taught.

A book of short stories of American history was used first.[1] It was chosen because the language and subject matter were neither childish nor over-complicated. The type was particularly clear and slightly larger than average and the lines of print were well spaced. All reading in the lesson period was oral and served two purposes; practice in clear articulation of words and correct interpretation of the printed material. All vowel sounds were slightly prolonged to prevent chopping off or slurring which caused poor rhythm and affected the articulation of the consonants as well. Definite articulation of all final sounds in words such as "coast," "arrived" or "make" was demanded for training toward a good pattern of speech. Any over emphasis smoothed out as speech became more fluent.

Polysyllabic words were divided into syllables if any sounds were slurred or omitted and the production practiced until the word was said clearly and correctly accented. Any words not readily recognized were sounded and then blended for understanding and pronunciation. The two men took turns reading aloud and they often made a game of catching each other on a mispronunciation, a slurred articulation or a dropped ending. They could not recognise errors quickly unless they followed the reading with attention and understanding.

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[1]Evans, L. B., America First.

Perseveration of the wrong pronunciation of a word occurred occasionally but was not common in either subject. During one reading period R. C. said "exhibition" instead of "expedition." He knew he had said the wrong word but repeated attempts to say the correct one only resulted in perseveration of the original mistake. The process of analysing a word into its sound elements and combining these into a smooth production proved the most effective and efficient method of overcoming the perseveration when it did appear. The process of analysis made a new mental set possible and gave control of the motor production in the pattern desired.

Understanding of the material as a whole was not stressed in the early stages since the demands of accurate production of each word required most of the attention until the process became more automatic. The men realized that a sentence did not "make sense" to them and would reread voluntarily. They were questioned on the story read as reading skill improved. With practice the reading of both men became more accurate and more fluent. They found that they were following the context more easily. They began to comment on certain points in a story when they finished reading it, and showed increased assurance when answering questions on the subject matter.

The training in clear articulation began to transfer to spontaneous speech. R. C. especially showed an improvement.

His articulation cleared, final consonants appeared and his timing improved to such an extent that people who knew him commented upon it.

As R. C. progressed in oral reading he began to enjoy silent reading. Starting with short stories and articles he soon found that he could follow and retain the content well enough to enjoy reading novels. When he found a word in his reading at home which he could not work out alone because it was both unphonetic and unfamiliar, he wrote it down and brought it to class. These words were sounded out with assistance and production and accent practiced, then the meaning was discussed. Toward the end of his training when the sound-symbol associations were well established he was taught how to use the phonetic spellings and accent marks in the dictionary to give him future independence in pronouncing unphonetic words and in adding new ones to his vocabulary.

Writing:

R. C. learned to write with his left hand after his right side became paralyzed. His handwriting was legible but he wrote slowly. His spelling was good and many of his sentences well constructed. He wrote words such as "if," "in," "the" and "at" more easily than he read them but they were frequently difficult for him and were sometimes confused with one another. His most consistent mistakes in writing were in verb tenses and suffixes such as "es," "ly" and "ed."

The following sentences were taken from spontaneous writing:

> It were 7:30 P.M. so I went to bed.
>
> It was 4P.M. and they tooked us in a barrack.
>
> The P.T. woman, who was an Australian, made me every day write with my left hand.
>
> He begun to read and I laught at him, who did better than I think I could.
>
> My thinking has been slow up.
>
> I was scared on shots enough and I wonder how it would hurt.

Most of the writing practice was done as homework. R. C. was given a picture from a magazine or advertisement and told to write a description of the picture or a story of the actions it portrayed. He progressed quickly to written synopses of radio broadcasts, movies he had seen or stories of a personal experience. He read the papers aloud in the lesson period and the teacher pointed out mistakes. R. C. made his own corrections in many cases, in fact, he recognized many of the mistakes while he was reading. Sometimes he would read a sentence correctly even though he had made a mistake in the written form. The teacher then checked the paper for misspelled words or other errors. Awkward sentences were written on the blackboard and studied for better ways of expressing the meaning. The emphasis was always on making the meaning clear in natural language. Stilted or precise grammatical constructions had never been used by R. C. and were not attempted here.

For instance, a sentence such as the example:

"The P.T. woman, who was an Australian, made me everyday write with my left hand."

would be written on the board and R. C. asked to read it again, then to suggest a better way of saying the same thing. Sometimes he could rephrase the sentence himself but usually a leading question or two was required to guide him. In the sentence above, he knew the wording was awkward and did not "sound good" but he could not find the source of the trouble, until he was asked:

"Do you every day come to school?"

He readily recognised the poor arrangement in familiar usage and rewrote the sentence:

"The P. T. woman, who was an Australian, made me write with my left hand every day."

The teacher then suggested that he did not say "teacher woman" or "doctor man" and that the term "P. T. woman" could be improved upon. R. C. had become familiar with the initials "P. T." in the hospital but did not know the word they stood for, so he was given the term "physiotherapist." The sentence was allowed to stand:

"The physiotherapist, who was an Australian, made me write with my left hand every day."

R. C.'s spelling was good in general but he depended entirely on visual memory of the word. If he could not "see" a word quickly and clearly he had no other approach. Although he was becoming skillful at associating a sound with a written symbol, he found difficulty in reversing the process. He was

given blackboard drills in writing the spelling or spellings of each sound as it was dictated by the teacher. For instance, the sound "k" (as in "key") as given on the Northampton chart is the primary spelling for that sound with "c" (as in "cat") and -ck (as in "pick") grouped under it as secondary spellings of the same sound. The vowel "e" (as in "eel") has four common spellings with "ee" as the primary. R. C. wrote all forms of each sound as they were dictated in more or less random order with consonants and vowels alternated. Sounds which caused difficulty were repeated frequently. The practice gave him a direct association between the sounds which appeared in words and their written forms.

Training in phonetic appreciation of the spoken word followed the sound-symbol drills. R. C. listened to a short phonetic word carefully produced, repeated the word, divided it into its individual sounds and then wrote it. Thus the drill material was put into use in simple forms until R. C. was familiar with the technique and his sound discrimination improved. Longer words were introduced and finally, polysyllabic words.

Words were also grouped into categories on the basis of specific sound-spelling relationships such as "c" as an "s" sound and "c" pronounced as "k":

"c" as "s"	"c" as "k"
cell	coat
center	coal
century	comb
cider	cup
cycle	cut
faucet	calculate
race	canvas
species	practical

Groupings were made for such unphonetic spellings as "ough":

o-e	uf	awf	ou	oo	aw
dough	enough	cough	bough	through	thought
though	rough	trough		slough	bought
thorough	tough				sought
					brought

or "ch" pronounced as "sh":

machine
Chicago
Michigan

or "augh":

"af"	aw
laugh	caught
	taught
	daughter

Many of the lists were made as homework and brought into class for checking. The pupil was not allowed to use the dictionary as a source, the lists were composed of words he thought of himself or came upon in reading or conversation. He classified them according to his own interpretation of the sound-spelling relationship. Sometimes the classification assigned was based on sound similarities regardless of spelling. R. C. made many mistakes at first, such as grouping "machine" with the "ch" (as in "church") group, but practice improved his ability to discriminate sounds not only for writing but in his own articulation. The auditory-symbol association did not interfere with his ability to spell in the normal way, on the contrary, it gave him an additional approach to spelling new words for both writing and speech.

About nine months after he entered Central Institute for the Deaf R. C. began to study left-handed typing at the

business school he had attended in the past. His studies there gave him additional practice in the use of words in sentence construction.

Arithmetic:

R.C. had excelled in arithmetic before his injury and was anxious to regain his skill in handling numbers. He had relearned how to tell time, count change and do simple calculation before he was discharged from the hospital. Number concepts were intact but calculation was disturbed by frequent inability to recall the name of a number unless he counted up to it. He showed no uncertainty or hesitation when counting up to large numbers. He recognised and used the arithmetic symbols such as -, +, ÷, * or x, in computation. He was able to give the answers orally if they involved no more than two digits but his responses were slow because of the naming confusion. He worked more quickly in written computation but here also he complained that it took him so long to name a number he wanted to carry that he "lost the other numbers."

The arithmetic difficulties were caused by the inability to recall number names quickly and by defects in reading where word problems were concerned. Therefore, drills in reading-writing and saying the numbers resulted in greatly improved computation. The drills would have improved only the ability to name numbers if the number concepts had been damaged.

The drills used for the training in number names were similar to those described for the sound-symbol practice. Numerals up to twenty were written on the board and R. C. named them as rapidly as he could as they were written in mixed order until one section of the blackboard was covered. Then the places were reversed and he wrote the numerals as they were dictated. The second procedure proved easy for him, he could write either the numeral or its name when it was dictated. His naming responses improved rapidly in both accuracy and speed. The names of the decades beyond twenty needed only short practice.

Simple additions, subtractions or multiplications were written on the blackboard in rows, then R. C. said the answers and wrote them as rapidly as possible. Next the three forms were mixed before division was practiced. He did a great deal of his computation practice as homework in which the examples were made progressively more difficult.

R. C. began to work on word problems while he was still practicing computation at home. Precise interpretation of the language in the problems was sometimes difficult. The importance of the "small" words which troubled him in his early reading was brought to the foreground. Since words such as "an" or "all" were often essential to the correct solving of a problem, he had to read carefully to understand the question involved.

The first problems were simple ones in a first level

arithmetic. R. C. read the problem aloud, stated the question to be answered, announced the process to be used (add, subtract, divide etc.), then gave the answer. The one step problems were continued only until he read and understood the language easily, then problems involving two processes or two questions to be answered were given. The arithmetic in these problems was easy for him and most of it was done orally. He never used a pencil and paper unless there were over four digits to be remembered. The emphasis in the problem work was on arithmetic language and its interpretation. Any construction which gave difficulty was repeated in additional problems until it was easily understood.

R. C. progressed to beginning algebra in about three months although only one lesson a week was devoted to arithmetic. After the first two or three algebra lessons he brought in some computations in square root which he had worked out at home. He could not work as fast as he had been able to do before his injury but he was not abnormally slow and his work was accurate.

Further training in arithmetic was continued in a course in bookkeeping at the business school. R. C. completed the bookkeeping with good grades and was later accepted for a more advanced course.

Summary:

When R. C. completed his course in typing at the business school he was fairly well advanced in his bookkeeping.

His speech and articulation had improved a great deal and the only obvious evidence of his aphasia was an occasional loss of a word. He read a great deal for his own pleasure. Oral reading was accurate but slow and deliberate.

R. C. tended to cling to the school environment and wanted perfection before he extended his activities. He was urged to try part-time employment as part of his training. A place was found for him by the Veterans's Administration. The hours were adapted to his school program and the employer was a man with whom he had worked in the past. He typed and filed invoices for a large trucking company. He was very hesitant at first but consented to try it out in March, 1948. After he found that he could handle the work he adjusted to it well and gained confidence.

The last few months of R. C.'s speech training were devoted to increasing the speed and fluency of oral reading and speech responses. He also practiced quick sounding and writing of polysyllabic words such as "international, responsibility, complications" and others which are in daily use. He was required to bring in some written material once a week. He was able to see and correct most of his own mistakes in these papers. The errors were slight and were usually of the same character as the original mistakes, although they were less frequent. The omission of the final "ed" to the past tense of verb forms was the most common mistake with an occasional awkward sentence construction. Sometimes a paper would contain no errors or omissions.

When R. C. was dismissed he was able to express himself in speech and writing and words were clearly produced. He said that he no longer "felt aphasic."

In June, 1949 he gave up his job to take full courses at the business school to prepare himself for a better position and had no fear of the future.

SUBJECT R. K.

Classification: Motor aphasia complicated by disturbances in reading, agraphia and acalculia, accompanied by right-hemianopsia. Traumatic origin.

R. K. enrolled at Central Institute for the Deaf in January, 1946, fifteen months after he suffered a shrapnel wound in the left parieto-occipital region of the head. He was injured in an infantry advance in France on October 6, 1944, after five hours of combat. He was not conscious until he awoke in a hospital in England, although he reported a few vague memories of being in an ambulance. Records are not available to indicate how long the period of unconsciousness existed.

R. K. was hospitalized for approximately nine months until his discharge from the army in July, 1945. Early in this period a tantalum plate had been inserted in his skull. Although he reported that following the insertion of the plate his speech and understanding improved, he complained that his speech was still "all scrambled up." Because of his report of some mild difficulties in understanding in the early stages following his injury, it is possible that his motor difficulty was accompanied by a sensory involvement. However, when he presented himself to us for his first interview and subsequently during the period of therapy, there was no evidence of difficulty in understanding speech. Therefore, for the purpose of this study he was classified as a case of motor

aphasia complicated by disturbances in reading, agraphia and acalculia.

When the training period described on the following pages began R. K. had regained a great deal of speech, reading to a lesser degree, writing and arithmetic not at all. He apparently had normal use of the right arm and leg, which according to his own report, had been affected by a right hemiplegia after his injury. He mentioned an occasional numbness or tingling sensation on the right side at times. R. K. had three convulsive seizures after he was discharged from the hospital, the last one occurring on December 3, 1946. Although he complained of a few attacks of "petit mal" during the three and one-half years he attended Central Institute for the Deaf, he had only one convulsive seizure in September, 1948 which occurred in the hospital shortly after an operation to replace his plate, which had been removed in June, 1946, because of an infection. His field of vision was limited by a right hemianopsia which prevented him from seeing an object on the affected side until it was moved to a position almost directly in front of him. Vision on the left side of each eye was normal.

After R. K.'s discharge his aphasia and associated defects prevented him from obtaining employment. He remained at home for about six months before he requested the Veteran's Administration to enroll him for speech lessons.

Social and Educational Background:

R. K. had a poor start in life. His family was broken

when he was about one year old and he grew up in foster homes. There were several changes in foster parents before he was five years old. Then he was placed with a family which kept him with them until he married. He went to school regularly until he was thirteen years old and completed the ninth grade. He could not continue because he had to seek employment to help his foster parents financially.

When R. K. entered military service he had become a master printer and was making reasonably good wages. He was married and had one child, a boy born in 1941.

As a small boy R. K. had overcome hardships and he faced his aphasia as another obstacle to be hurdled. He was even tempered with a quick and ready wit. His first adjustment to civilian life was unfortunate because the only home his family could find was with relatives and friction was unavoidable in a crowded home. His wife was helpful and understanding but the situation itself caused a certain amount of irritability between them. The next summer they were able to rent a small house in a veterans housing project and they were both much happier. There were periods of discouragement when he would discuss his problems and ask for advice in solving them but he never attempted to evade his responsibilities.

R. K. was an affable and likeable person. He was a good student, cooperative and intelligent. With the help of his wife he practiced assiduously at home and showed steady

progress. Although he was self-conscious about his lack of schooling, his alertness and initiative had enabled him to acquire a vocabulary and a store of general information far beyond what one would expect from his academic opportunities. He was hopeful of an eventual return to his old trade although he realized that he would have to start at the bottom and would probably never regain his former skill. At thirty-one years of age he was willing to begin again with the knowledge that he might fail as a printer and have to learn a new trade. This ambition, coupled with a willingness to work gradually toward his goal made him a steady and persistant pupil.

APHASIC MANIFESTATIONS AT THE BEGINNING OF TRAINING

Speech and Understanding:

R. K.'s speech was often slow with an occasional fine tremor of the lips, but many everyday expressions and slang phrases were spoken rapidly and with facility. Sentence structure was normal and the articulation of most words was clear. There was infrequent difficulty in word finding, but he named objects correctly. Paraphasic symptoms characterized by needless repetition of syllables or insertion of superfluous syllables appeared at times. Sometimes the words of a phrase would be confused in sequence. For example, the word "measles" was pronounced as "measelers." He recognized his mistake but could not correct it. One day he tried to use

the expression "a word in edgeways," it came out "a word in sidewards," "a side in wordways." He changed the wording in every attempt but was unable to say the phrase correctly until it was said for him. These disturbances did not appear frequently enough to interfere with the intelligibility of most of his conversations. According to his own description of his early speech similar confusions had been frequent. He also reported difficulty in naming objects soon after his injury.

R. K. showed no defect in understanding and was quick with humorous repartee, which, though sometimes trite, was always appropriate to the conversations. He followed directions without hesitation and answered questions correctly.

The only speech training he received during hospitalization was given by a sergeant whose qualifications could not be ascertained. R. K. felt that other patients in the hospital had given him the most help.

Reading:

Oral reading was very slow and R. K. frequently became confused because he omitted the last word or two at the right side of the printed page. These omissions were due to the restricted visual field on the right side of each eye. In a sentence such as "Springfield is the capital of Massachusetts," he read "Springfield," "capital" and "Massachusetts" slowly but with assurance. The words "is," "the" and "of" were studied and read with difficulty and "of" was

read "in." Polysyllabic words were often read easily but endings such as "ing," "ed" or "ly" were frequently omitted or interchanged. Infrequently paraphasic symptoms appeared which were similar to those described in his speech.

When R. K. read silently he could grasp the general subject matter of a short article. He said that he looked at the newspaper everyday but that he seldom attempted much more than the headlines and the baseball scores because he became confused and lost the meaning.

Writing:

R. K. wrote nothing spontaneously except his name. He copied well and had no difficulty with the letters although his writing was slow and uneven. He used his right hand. He could write a sentence of four or five short words from dictation but there were many misspellings. He wrote as though he had difficulty in controlling his hand movements.

When training began the improvement in writing was so rapid that it seemed logical to assume that there had been some partial recovery of writing ability which went unnoticed because of lack of practice. R. K. said that he knew what he wanted to put down but "couldn't get it verbally."

Arithmetic:

R. K.'s ability to calculate was severely disturbed. He could not count change, nor could he do simple subtraction, multiplication or division. The only computations he could

accomplish consistently were the additions up to the sum of ten. His wife had taught him the individual coin values and the names of the coins. She had also helped him with his numbers so that he could name most of the numerals up to twenty when they were shown in random order. When R. K. first returned home he counted up to the number he wanted before he could name it. He had also learned to tell time, although he still had some confusion in designating the minutes before or after the hour.

LESSON PROGRAM AND LENGTH OF TRAINING

R. K. was enrolled at Central Institute for the Deaf for three and one-half years, from January, 1946 until June 15, 1949. During that period lessons were suspended for a total of approximately eight months because of summer and Christmas vacations. Another three months were lost because of operations. In June, 1946 R. K. missed six weeks when his plate was removed because of infections which began to appear around the pins which held it in place. In September, 1948 the plate was replaced and he missed a second six weeks of training. Neither of the preceding operations caused any loss of the material learned and he was able to continue without review when he resumed his lessons. He said that he had some difficulty in speaking for the first day or two after each operation but the confusion cleared rapidly.

During the first five months of their training R.K. and R. C. were taught together in two two-hour lessons a

week. Then R. K. entered the hospital for his first operation. When he returned the program was changed to one two-hour lesson with R. C. and one one-hour individual lesson a week. The combined lessons were devoted to reading and the individual lessons were devoted to writing at first, then arithmetic later. In the fall of 1947 arrangements were made with the Veteran's Administration to give each veteran three lessons a week, and R. K. had one reading lesson with R. C. and two individual lessons each week for the rest of his training.

TEACHING PROCEDURES

Reading and Speech:

R. K. and R. C. entered training at the same time and they worked well together on the syllable drills, word building and reading. The phonetic training presented no unusual problems which required special techniques beyond those described in the chapter on General Teaching Procedures. Sentence building through picture descriptions and experience stories was not necessary in either case and reading of the printed page was started while the final speech sounds were being taught. The newly learned technique of sounding out the individual sounds and blending them into the word was used whenever a word was not recognized quickly.

R. K. practiced conscientiously at home with the help of his wife and his reading improved steadily through the

oral reading with emphasis on articulation and accuracy. It was slow at first, almost one word at a time, but increased skill and confidence brought fluency. There was some difficulty because of the limited field of vision, but he learned to move his eyes to check the margin of the page to compensate for the lack of right side vision, and the omission of final words of the line of print became less and less frequent. He began to read aloud to his small son from childrens' books. When the boy complained that he read too slowly, he worked at increasing his speed and put more expression into his voice to hold the child's attention. This type of motivation was an important factor in his reading improvement.

With practice R. K. began to recognise as a whole many of the words he had to analyse sound by sound in the earlier reading. The suffix "ly" and occasional paraphasic symptoms on words of four or five syllables caused the most persistent confusion. A word such as "lively" might be read as "living," or "quickly" as "quicker." The usual technique of analysis into sounds followed by the blending into syllables was used but the syllables were said several times with emphasis. For instance, the word "lively" was divided into its component sounds "l i-e v l ee" then these grouped into "līve" "ly." These two syllables were repeated, with the deliberation and careful articulation used on the drills, for three to four times before the word was said as a whole.

In the earlier stages of the training the original mispronunciation sometimes persisted when the blending of the word was attempted and the whole procedure was repeated until this perseveration was overcome. In most cases, however, concentration on the articulation and the sequence of sounds and syllables was sufficient to give control of the speech muscles in the pattern desired. Adherence to a disciplined approach to words ending in "ly" eventually overcame the difficulty almost completely and these words were read as a whole without hesitation.

The paraphasia was treated in the same general way and extra practice was given by choosing polysyllabic words at random from a newspaper and writing them on the board. Words such as "publication," "legislature," "recognition" and "appropriation" were used since they were easily within the range of R. K.'s normal vocabulary and were in common usage. Each word was read, by sounds and syllables as described before, said from memory by syllables, then as a whole, and written from memory. Although there was still infrequent paraphasia when his training was completed, R. K. was able to correct himself in one or two attempts instead of creating more confusion on each repetition.

R. K.'s speech showed marked improvement as his oral reading improved. The transfer was made without special teaching. Speech became more fluent, the lip tremors disappeared and the whole speech response more nearly normal.

It was like someone learning a foreign language who had finally reached the point where he not only spoke the language but thought in it. When R. K. was dismissed the average listener would have noted little evidence of speech difficulty.

Writing:

As new syllable drills were taught R. K. practiced writing them at home. He copied both the drills and the words built from them. He thereby gained proficiency in the writing movements. Within a short time he was able to write a list of the names of objects in a picture. He took a new picture home from each lesson and now wrote the word-list without supervision. He improved exceptionally fast and after three or four assignments he was told to write a short sentence using each word. To give him a guide for the first sentences the question, "Where $\left.\begin{matrix}\text{are}\\\text{is}\end{matrix}\right\}$ _____?" was written at the top of the page and he was told to write answers for it. The first paper represented a great deal of work. R. K. said aloud the sentence he wanted to write and then repeated each word as he wrote it. The result included such sentences as the following:

The curtains are in the window.

The flowers are selling (sitting) in the window.

The divan is near the window.

There are books on the desk.

After several attempts he became increasingly versatile in

his sentence constructions. The most common mistakes involved verbs and plurals. Some typical examples are:

The people are to church.
(The people are going to church.)

The dog is the planting of milk.
(The dog is getting plenty of milk.)

The girl crinoline are very pretty.
(The girl's crinolines are very pretty.)

There were some misspellings, usually the omission of a letter or a syllable:

Christas	=	Christmas
excitment	=	excitement
varity	=	variety
potatos	=	potatoes
phiscal	=	physical

R. K. recognised and corrected many of the spelling mistakes by listening to himself say the word aloud and then analysing it.

The following sentences were chosen at random from papers submitted by R. K. at various times during his training. No corrections have been made by the writer. The words in parentheses in the later sentences were left by the subject to show when he made a mistake and his own correction.

March, 1946. A family on five is a nice one.
I like the hat on the man with the maroon automobile.
I had just about one year old, so people tell me, then I had separated and the rest of the family.

July, 1946. The sun is shinning bright today.
The nights are starting to getting shorter day.
I am making sentences so that I can read and write again.

March, 1949. I never saw so many (a disk) dishes

and pots and pans in all my
life.
In a few months I will try
my luck once more.
We contacted our (wifes) wives
over the telephone and it was
just like a reprieve from
prison.

It is probable that R. K. could have started writing much earlier if he had had guidance. This seemed to be a case where there was some unrecognized spontaneous recovery which needed motivation and guidance more than a complete relearning. There were some definite aphasic disturbances such as the examples above which required continued practice but the first rapid gain was in marked contrast to the rate of progress of most of the other subjects with writing difficulties.

In connection with the writing and spelling it is of interest to note R. K.'s return to setting type. In October, 1946, he was given a part time job at the printing shop where he had worked for fourteen years before he went into the army. He was set to cleaning and sorting type. He worked very slowly at first because he had forgotten the location of the letter compartments in the type case. Formerly the sorting of letters into their proper compartments had been as automatic as the touch system to an expert typist, but now had to be completely relearned and adjusted to a limited field of vision. R. K. was allowed to practice some type-setting in spare moments and found that he had no added difficulty in arranging the type upside down and backwards in

the stick. In fact, he said he could sometimes set without hesitation a word which he found troublesome to write or spell. By the summer of 1947 he was able to set up small jobs alone and even helped to "make-up" the pages of a catalogue. His foreman reported that he was slow but that his work never had to be reset. By June, 1949, he was doing occasional production work (special orders which had to be done quickly) although he was still far from his old rating as a master printer.

Arithmetic:

Although the subject had some concepts of the application of numbers to specific sutiations such as money, he had lost almost all of his ability to manipulate them. He knew that numbers could be added, multiplied, divided or reduced by subtraction but he could not accomplish any of these operations unless he could count to the answer.

In order to lay a foundation for developing skill in the use of numbers the reteaching of arithmetic was not started until reading ability reached a point where the technique of analysing a word presented no serious difficulty. Therefore, when reading was fairly well established, one lesson a week was devoted to arithmetic.

The arithmetic work was related to R. K.'s daily needs, for example, the names of numbers were taught in preparation for learning to count change. His wife had taught him the coin names and values. She had also taught him the

names of many of the numbers so that he seldom had to resort to his original method of counting to the individual number wanted. However, his responses were very slow and there was some confusion in naming the decades after twenty.

Drills in number naming constituted the opening procedure. The name was written in full on the blackboard and R. K. read the word aloud and then wrote the numeral after it. These names were not written in the counting sequence but in random order. The next drills were designed to increase the speed of the reaction and consisted of numerals written rapidly on the blackboard while the subject read them as fast as they were written. Any numeral which caused hesitation or was wrongly named was inserted frequently for learning. Then the positions were reversed and the teacher dictated the numerals for the subject to write quickly. When he was responding with confidence to numbers up to one hundred, practice in counting by fives, tens, was introduced.

R. K. was presented with nickels and dimes and practiced sorting them into stacks of various amounts. The commands were:

"Give me fifty cents."
"Give me one dollar."
"Count seventy-five cents."

The coins were then varied so that he could not use all nickels or all dimes in finding the amount asked for and he had to combine the two coins. The teacher would sometimes put a collection of coins before him, such as three dimes, two

dimes and a nickel, or three nickels, and ask him how much money was there. A quarter, and later a fifty cent piece, was presented and the questions were:

"What is this?"
"How much money is it?"
"How many nickels will you give me for it?"

The new coins were added to the collection and the amounts figured including them. Quarters and half-dollars had to be counted by fives or tens to the number wanted at first, but he learned to make the additions as a whole. He learned to group the coins in all of the combinations up to one dollar. All work was oral.

R. K. was given a dollar bill and told that his pencil cost ten cents and that he had to pay for it with the dollar. The teacher took the bill and counted out his change starting with the purchase price of the pencil: "ten, twenty, twenty-five (a quarter given him) fifty, (a half-dollar) one dollar." Other transactions were made the same way giving change for various purchases with quarters and other coins tendered in payment. Then the teacher bought something from the subject and the process was reversed. The first transactions were figured so that the choice of coins was almost obvious, then the problems became more complex. After R. K. became skillful with the coins, paper money from a child's game was introduced and the lessons soon involved relatively large sums of money.

Simple addition and subtraction were the only forms

of computation R. K. could do mentally. He could add two single digits with little difficulty, either oral or written. Numbers of two or three digits which required no carry-over were next introduced and he practiced them on the blackboard in class and on paper at home. The concept of the carry-over confused him. Although he could answer easily when asked how much twenty-five cents and seventy-five cents would be, he could not write the answer to the same problem written as a sum in addition. In the first instance he really counted by twenty-fives. He could, of course, write the correct answer to a few of these problems if he said them aloud, but it was simply a learned response and not true addition. When given a problem such as:

$$\begin{array}{r} 468 \\ +164 \\ \hline \end{array}$$

he tried to add the next set of digits to the sum of the first two. He said: "Eight and four are twelve and six is eighteen," etc. He could see no reason for writing down "half of the number," when he was told to write the two and put a little "one" over the number six.

The confusion was solved by writing the problems out step by step in the following manner:

$$\begin{array}{r} 468 \\ +164 \\ \hline 12 \\ 12 \\ 5 \\ \hline 632 \end{array}$$

By writing down the complete number the pupil could see where the sum of each set of digits fitted into the scheme of the

whole. After practice of several similar additions in the lesson period he understood the method well enough to be given some problems as homework.

At the next arithmetic lesson the teacher suggested that the problem would be shortened by writing the numbers in the following way:

$$\begin{array}{r} {\scriptstyle 11} \\ 754 \\ +\,677 \\ \hline 1431 \end{array}$$

As the example was figured on the board each step was said aloud:

> Four and seven are eleven, put down one and carry one (as the small one was written above the five). One and five are six and seven are thirteen,. . . .

Oral verbalization was done through the whole problem, then another set of figures was written for R. K. and he handled it successfully. The original problem was not erased until he had completed the new one so that he could use it as a guide. He understood the "little figures" then and transferred easily to the shorter method.

Each new process of arithmetic had to be analyzed in a similar way. After the whole pattern was made clear and R. K. understood the details of the process the elaborations were eliminated and conventional shortcuts used. He had to continue writing carry-over figures for a long time before his memory span improved to the point where he could retain the number.

When R. K. could add two figures of three or four digits, with or without carry-overs or zeros, subtraction practice began. As each difficulty in subtraction was overcome, examples for continued practice were mixed in with examples in addition. By the time multiplication was introduced R. K. was adding and subtracting four and five digit figures and adding columns of five figures in length. Even during the long period when he was relearning his multiplication facts, he did regular practice with the addition and subtraction to which the new processes were added as they were learned. Thereby each new process was included and he became flexible in the use of them all.

The homework in arithmetic was sometimes groups of examples dictated by the teacher for specific practice, but whenever possible, certain pages of computation were assigned in an arithmetic book. R. K. seemed to gain more satisfaction from studying in the book and often found additional pages that were within his level of progress and practiced these also. In lesson periods all examples, with the exception of those used to demonstrate a new process, were dictated to the pupil. The whole number was spoken, carefully enunciated, and repeated in full if he could not remember all of the digits. For instance, 174 was dictated "one hundred seventy-four" not as "one, seven, four."

The printed word problems associated with each new step were always added as soon as R. K. had acquired reasonable

skill in the process required. Each new step was isolated only until he understood and could use the technique and had gained some confidence in its use. There was no demand for speed, accuracy was of more importance. Practice and use increased the speed without special drills. Number naming and training in multiplication facts were the only two steps where any definite attempt was made for quick response.

In the early work in subtraction R. K. often reverted to addition in the middle of a problem. Therefore he was required to say aloud:

"Take seven from nine," and so forth, as he worked. Sometimes he would say:

"Nine from seven leaves two."

These reversals were sometimes made and the correct answer given as above, but more often they led him into adding the two numbers. Training in subtraction required longer practice than in addition, but the process was finally mastered. Computation in addition and subtraction were contrasted in lesson practice and in homework and he learned to identify the symbol for each and to handle the examples correctly.

Borrowing in subtraction had to be presented with the "1" of the borrowed "10" inserted beside the figure it was added to, and the numeral borrowed from crossed out and changed in the following way:

$$\begin{array}{r} {}^{6}\not{8}\,{}^{1}\not{7}\,6 \\ -\ 4\,5\,7 \\ \hline 4\,1\,9 \end{array}$$

When R. K.'s ability to remember numbers improved he dropped the insertions and the crossings out voluntarily.

Simple word problems using addition or subtraction came next. The pupil read the problem aloud, stated the process required and then figured the answer, orally, if possible, or with pencil and paper. R. K. understood simple problems readily and was able to practice at home with a workbook.

The introduction of the zero in subtraction caused difficulty. Since a zero added to a number or subtracted from a number did not change the original number R. K. could not understand why there was a change when a number was subtracted from a zero in the minuend. The best approach seemed to be through the use of money terms, so he was asked the question:

> "If you had a dollar and lost ten cents, how much would you have left?"

He knew the answer to that,

> "Ninety cents."

The example was then written on the board and explained aloud as the teacher subtracted it:

$$\begin{array}{r} 100 \\ -\ 10 \\ \hline 90 \end{array}$$

> "Nothing from nothing is nothing. (Writing zero.) One from nothing will not work, but if I say one from ten, that leaves nine."

Then R. K. subtracted several examples in the same way, but without the verbalization and became used to thinking of the

zero as ten. Then an example subtracting 20 from 200 was introduced and when he hesitated the suggestion was made that he would have to borrow one from the two to make his ten. When he had learned to subtract with one digit and a zero in the subtrahend the examples were changed to require him to subtract two digits from the minuend with two zeros in succession:

$$\begin{array}{r} 100 \\ -\ 85 \\ \hline \end{array}$$

The first zero to the left gave him no trouble, he simply made it a ten. Then he started to subtract eight from ten but was stopped with the remark, "You have already borrowed one from that ten. You will have to change it to a nine." Several examples subtracting odd numbers of two digits from one hundred were practiced because the change from ten to nine after borrowing was easy to see. Then the examples were made more varied and one or more zeros used in different locations within the minuend.

Multiplication also had to be relearned completely. Even the simple multiples were lost and R. K. began by re-learning the multiplication tables. He memorized one table at a time by writing and saying them at the same time. As each new table was learned it was added to mixed drills in which the multiplication facts already learned were practiced in random order both orally and in writing for quick response. Thus, although the tables were learned in sequence, he was not allowed to become dependent on the series to find his answer.

Much of R. K.'s success in the relearning of his arithmetic was due to his persistent practice at home. Multiplication memorisation was long and arduous and an impatient attitude would have rendered it impossible. His wife helped him greatly by giving him drills at home and in particular, by seeing that nothing interfered with his study periods. His dilligence was rewarded by realisation of his steady progress.

Multiplication of larger figures presented still another difficulty. When R. K. was given the example:

$$\begin{array}{r} 134 \\ \times\ \ 2 \\ \hline \end{array}$$

he said: "Two fours are eight," wrote it in the proper place and then wrote the one and three below the line as in addition. For example:

$$\begin{array}{r} 134 \\ \times\ \ 2 \\ \hline 138 \end{array}$$

He was told: "You made a mistake. You forget to multiply all of the numbers." The same example was written in another place on the board, without erasing his, and the teacher performed the multiplication in a deliberate manner, verbalising each step. Each number was touched with the chalk as the name was spoken and the answer to each process said aloud and then written in its place. Then the wrong answer to R. K.'s example was erased and he was told to try it again. Twenty or thirty similar examples were figured and no attempt was made for speed. There were no carry-overs in

any of these computations. For the first five or six examples R. K. said the numbers aloud as he multiplied. He reverted to addition a few times in the early practice but by the end of the lesson he was proficient enough to be given more examples for homework.

The next examples required carry-overs with a single digit in the multiplier. R. K. wrote the carry-over number lightly below the line and then covered it with the final figure until he gained confidence in the multiplication process.

When two digits in the multiplier were introduced the procedure of verbalising the demonstration example was again used. The stepping-over process of putting the results of multiplication of the second digit directly under the digit was stressed. No zeros were used in the multipliers at this stage.

Zeros in the multiplier were introduced after the subject understood the operation of using the two digit multiplier. He was shown an example with the row of zeros written out:

$$\begin{array}{r} 185 \\ \times\ 20 \\ \hline 000 \\ 370 \\ \hline 3700 \end{array}$$

Then all but the right hand zero was erased and he was shown that the result was the same. Then he was taught to write the example:

$$\begin{array}{r} 185 \\ \times\ 20 \\ \hline \end{array}$$

The introduction of a third digit into the multiplier caused no confusion. Some help was needed with a multiplier such as 305 but this was taught by a demonstration of the row of zeros as above and the correct placement shown.

Division was, of course, the last of the basic arithmetical processes to be introduced since its operation involved the use of the other three forms of computation. As with addition, subtraction and multiplication the new technique was started with simple examples and the pattern of division built up step by step.

The first approach to division was made through multiplication in the following way. The example:

4/8

was written on the board and the teacher asked:

"How many fours in eight?"

When R. K. could not answer, the example

__ x 4 = 8

was written and he was told to fill in the missing number. Then the 2 was written above the line on the first example. After several attempts the pupil could write the correct answer although he usually had to say the appropriate multiplication fact aloud before he was sure he was right.

Then the teacher worked a similar problem aloud and carried it a step farther. In an example

2/9

she said:

"There are three threes in nine."

Then she wrote the three above the line and said:

"Three times three are nine," pointing to each number as it was named, and wrote the nine below the first one.

$$2\overline{)\begin{matrix}3\\9\end{matrix}}$$
$$\underline{2}$$

The pattern was very confusing at first and the numbers to be multiplied had to be pointed out for the first eight or ten examples.

Since the number of single digits which divide evenly are limited, the length of the dividend was soon extended to two figures such as twelve divided by four, sixteen by eight and twenty-five by five. In preparation for more difficult problems the question was asked: "How many fours in one?" "It won't go." "Then let's use the next number too. How many fours in twelve?" The problem was then worked out and the subject practiced on several others. Then he was given examples for home practice.

The next step added another number to the quotient in examples such as sixty-four divided by two, fifty-five by five and thirty-nine by three to introduce dropping the next digit below the line to be divided. The examples were written as follows:

$$2\overline{)\begin{matrix}32\\64\end{matrix}}$$
$$\begin{matrix}6\\\underline{4}\\2\end{matrix}$$

There was no attempt to teach a quick response with

short division. The problem was not to prepare for higher mathematics nor for work requiring mathmetical skill. The goal was to build an independence in the use of arithmetic as it would be needed in everyday life. It is granted that the examples above could have been done easily without the process of dropping the figures but the pattern would be needed later with more complex problems and was more easily learned with simple numbers which could be grasped at a glance without distracting from the procedure. Long division might be slow in many cases but it wasmore easily checked for accuracy and the one process could be used for numbers of any length. R. K. was intelligent and practical enough to drop any unnecessary writing step when he found he could succeed without it.

The division of odd numbers with "left-overs" came next, then longer dividends, followed by work with divisors of more than one digit. Zeros were introduced, and then decimals. R. K. learned how to multiply the divisor and the quotient to check his answers. He learned to make either a fraction or a decimal with the remainder. In every case each process was demonstrated and practiced until he could work independently.

R. K. often had a practical application for his arithmetic in the woodwork he was doing in the Occupational Therapy Workshop,[1] and in improvements and repairs he made on his own home. He learned to figure measurements and areas

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[1]Occupational Therapy Workshop, St. Louis, Mo.

with little difficulty after he could handle the computations involved and transferred a great deal of his arithmetic to practical use on his own initiative.

Training in fractions was confined to the basic processes of reducing them to their lowest terms, finding common denominators, and using them in addition and the other arithmetical operations. Although R. K. understood fractions enough to select one-fourth as a larger number than nine-sixtieths his ability to use them was limited to the addition of halves or quarters. Relearning was very slow and many written props were used before he grasped each new concept. In learning to reduce a fraction to its lowest terms he understood that he had to divide but he had to write out each number to be used as follows:

$$\frac{12}{68} \div \frac{4}{4} = \frac{8}{17}$$

for a great many examples before he could remember to divide both parts of the fraction by the same numeral.

The difficulties encountered in arithmetic were consistent in each form of computation, an almost complete loss of the operations required, and a short memory span for numbers. R. K. did not grasp a new process quickly, and there was no recall from previous knowledge beyond the few simple additions mentioned earlier and a partial recognition of some fraction values. Each form of computation had to be clearly diagramed until he built a concept of it. Each form was learned by diligent practice. R. K.'s reasoning

was good on word problems and he had comparatively little difficulty with them since they were not introduced until the computation needed had been taught.

At the end of R. K.'s teaching he could use five or six digit numbers in the four fundamental operations of addition, subtraction, multiplication and division. He understood the use of the decimal in the monetary system and as a way of expressing fractions, although his understanding of the last use was limited. He could repeat six digit numbers and write them to dictation. He could use a ruler and figure square inches, feet or yards. His use of fractions was limited but was adequate for his probable needs. He regained much of his pre-morbid ability in arithmetic with the exception of speed of performance.

Summary:

R. K. was dismissed at the end of twenty-nine months of training, over a period of three and one-half years. He had not fully regained his pre-morbid efficiency but neither had he reached a plateau of learning. He had no hesitancy in meeting or mixing with people and made friends easily. He read the newspaper regularly and subscribed to one of the better digest magazines. He corresponded with several of his former buddies.

The only evidences of aphasia R. K. presented at the time of his dismissal were so slight that only an experienced observer would recognize them as abnormalities. His language

and speech were satisfyingly close to normal. Oral reading was slightly slower than normal but he read smoothly with only a few hesitations to analyze words. His handwriting was excellent. Written language contained a few awkward constructions as the use of "ing" in the wrong place and the phrase "let a couple of doctors to look at it," which appeared in one of the last papers he turned in. The same paper had a few spelling mistakes such as "allong," "awill" for "awhile" and "snoorted" for "snorted." All but the last mistake had been recognized and corrected. In these last papers R. K. crossed out his mistakes lightly instead of erasing and then wrote his correction if he saw it immediately, otherwise the correction was written above. The system gave a fairly clear picture of his writing difficulties and where they appeared. R. K. was versatile in his sentence construction in both speech and writing and could correct approximately all of his errors. There was no doubt that he would continue to improve without formal lessons.

R. K. persisted at his typesetting and was put on full time after he left the school. He will probably never regain his old rating of master printer but he can work at his trade.

SUBJECT E. H.

Classification: Severe Motor Aphasia complicated by elements of sensory aphasia, with alexia, agraphia, and accompanied by right hemiplegia and a right hemianopsia. Traumatic origin.

White male, aged 35. Right-handed.

E. H. entered Central Institute for the Deaf in March, 1947 when he was thirty-five years old, almost two and one-half years after the onset of his aphasia. He was serving in Italy as an infantry private when he received a bullet wound in the left side of the head on July 15, 1944. No records were available on the period of unconsciousness but E. H. thought that it was a "week or so." There was a complete loss of speech after the injury, but he said that he could understand slow speech after the first return to consciousness. Two pantalum plates were inserted during hospitalization, one in the left temple and the other over the left parieto-occipital region, probably covering the points of entry and exit of the missile. Sometime during his convalescence after he had been returned to the United States he was seriously ill with pneumonia, the date could not be ascertained. He was given some speech lessons during hospitalization and he gained a small vocabulary composed of nouns and a few verbs, his understanding improved and he learned to copy with his left hand. E. H. spent twenty-two months in the hospital and was discharged in May, 1946. His wife was told that he had reached a plateau of learning.

After two more short periods of hospitalization because of drainage from the site of the posterior plate, an operation was performed to remove it. E. H. was still bandaged from the operation when he was sent in to Central Institute for the Deaf to begin his speech training. He was about six feet tall and extremely thin. He walked with the aid of an ankle brace on the right leg and a cane. He had no use of his right arm although he could move it slightly, however, most attempts to make such movements caused severe tremor of the arm. He was subject to seizures, which became as frequent as two or three a week in January, 1946, until an adjustment was made in his medication. Movement of the facial muscles was slightly sluggish on the right side of the face, but the tongue showed very little deviation to the right when extended. A right hemianopsia limited his visual field and he showed no consciousness of an object held on that side until it was moved almost directly in front of him. E. H. was intelligent and cooperative but he was easily distracted by extraneous sounds or activities.

Social and Educational Background:

When E. H. first returned home from the hospital he was extremely self-conscious about his condition and his wife reported that he didn't want to see people he knew for several months. However, they lived in a small town and meeting friends was unavoidable so that he overcame a great deal of his tendency to hide. After his vocabulary had been

increased by his training he began to enter into conversations and contributed as much as his limited ability would permit. Unfortunately, speech training necessitated a move to the city where he and his wife had difficulty finding congenial living quarters. After a series of boarding houses they found a comfortable apartment and the situation improved even though they were on the second floor and E. H.'s difficulty negotiating steps limited his activities. Since his balance was uncertain, he avoided crowds and social contacts were limited in a strange city.

The subject had been a healthy, husky man who had worked for several years on state or county road patrol and road building, driving large caterpillar tractors or graders. He preferred the outdoor work although he had had one term of business college after graduation from high school and worked as a bookkeeper in a county clerk's office. His continued physical weakness after his injury and the continued drainage from his wound during the nine months before the plate was removed developed a habit of worry which was encouraged by long hours of idleness. There was always some specific basis for the onset of each session of worrying, but E. H. magnified its importance and his thoughts clung to the one subject until it was settled. He would work during the lesson periods despite his problems but he refused to practice at home unless all of his affairs were going smoothly. His wife was loyal and anxious to help but she had been used to depending on him in the past and was not aggressive

enough to stimulate him. The two were extremely close and dependent on one another.

In the spring of 1949 E. H. had what appeared to be a severe heart attack and was hospitalised for several weeks for observation. During the course of the examination tuberculosis was suspected and he was thoroughly tested. The tuberculosis tests were negative, a cardiogram showed no heart damage and he returned home feeling very well. His wife had told friendly neighbors about the tuberculosis tests and although she had said that the results were negative, one couple pointedly avoided E. H. on his return and refused to allow their two-year old son to go near him. E. H. was very fond of the boy and they had become fast friends, therefore the situation gave him new cause for worry. He and his wife decided to buy a small house in a new neighborhood. After a tiring search they found prices so high and values so low compared to what they could find in their small home town that they ended by building a house in their own town. The decision was not discouraged because it was felt that E. H. had progressed far enough so that he could carry on with the help of a school teacher and that the psychological benefits far outweighed other considerations.

APHASIC MANIFESTATIONS AT THE BEGINNING OF TRAINING

Speech and Understanding:

Spontaneous speech was limited to nouns with the occasional use of a verb. E. H. used a few phrases such as

"That's right." He could not formulate even a simple sentence. What he could say was clearly produced. He knew when he had used the wrong word, and attempted correction. Sometimes it was obvious from his expression that he knew the word would be wrong before he said it but he could not check the utterance.

E. H. showed no evidence of difficulty in following conversational speech and his answers were appropriate though limited in content, but he became confused when several people were talking. He listened to the radio and followed the baseball games faithfully. It will be shown in the teaching procedures that there were defects in understanding in certain situations.

Reading:

Reading was impossible for E. H., either orally or silently. He conveyed the information by a combination of words and gestures that he could sometimes understand the meaning of a sign such as, "For Sale." He could pick out a word when he was told it was in a certain line of print, but he could not say the word even though he recognized it as the one the examiner had said.

Writing:

The only thing E. H. could write spontaneously was his own name. He had learned to use his left hand to copy printed material in his previous speech training but the words had no meaning for him. He could not write even single

words from dictation.

Arithmetic:

E. H. could count without hesitation by ones, fives and tens. He needed no prompting to help him start the sequence, the command, "Count by fives," was sufficient. Counting by twos was good up to twelve when he became confused naming the numbers, but he picked up a pencil and wrote the numerals correctly up to twenty-four. He could not name a number out of sequence, so he counted rapidly up to the number wanted and then said it. He gave his army serial number by means of counting up to each number and gave the seven digits in correct order. He had some arithmetic work during the speech training in the hospital.

Although E. H. had difficulty naming coins he knew their values, and knew when he had been given the right amount of change. He handled his own cash transactions. He could state the time orally, although he sometimes counted quickly by fives to arrive at the correct number of minutes.

E. H. could add two digits orally in a halting manner because of the difficulty in number naming. He wrote the following additions on paper:

67	56	19
78	67	90
145	123	109
		179

He counted aloud to the number he wanted to write down, but could not write the numeral, which had to be written for him to copy. He did not seem to count up to the first number and

then continue to count through the second number to arrive at the sum, on the contrary he seemed to realize the sum quickly and counted to be able to find the name. He could subtract a few simple examples such as,

$$\begin{array}{r} 10 \\ -\ 6 \\ \hline \end{array}$$

but it was much slower than addition. He failed to multiply or divide.

LESSON SCHEDULES AND LENGTH OF TRAINING

E. H. attended Central Institute for the Deaf from February 28, 1947 to the end of November, 1949. Approximately ten months should be subtracted for summer and Christmas vacations, since E. H. did not take advantage of the opportunity to continue his lessons through part of the summer as most of the other men did. Another six weeks were lost when he was hospitalized, after what was thought to be a heart attack, for all of April and two weeks of May, 1949. He frequently missed single lessons because of colds, headaches, or tooth infections.

For the first month of training E. H. had two or three lessons a week. When he had fully recovered from his operation and been discharged from the shopital he had five lessons a week for the next three months. When he returned to school the following October, he had three lessons a week, for the remainder of his training.

TEACHING PROCEDURES

Reading and Speech:

E. H.'s teaching began with the introduction of a consonant and about three vowels, such as "m," "o-e," "ee" and "oo." These letters were put into a syllable drill as soon as he could point to each individual symbol and say its associated sound. He had a difficult time remembering a sequence of two sounds long enough to repeat them for the three syllables across the page of the note book. In a drill such as,

mo-e mo-e mo-e

he had to be given the pattern of the first "mo-e," then by the time his finger had moved on to the next syllable the memory of what he had said before was gone. Parrot-like imitation or quick prompting would not have encouraged either retention or recall. Therefore, he was again given the speech pattern for the first syllable only and required to carry the memory of the sound for the other two repetitions. When he found that he was responsible for repeating the two sounds from memory, he concentrated his whole attention on the task at hand.

As each new consonant or vowel was taught it was written on the index page before it was incorporated in a drill. E. H. had such a short memory span for the written symbols that it was helpful to have him say the accompanying sound aloud as he wrote the symbol several times after it had

been introduced to strengthen the association between the visual and auditory images and the motor production.

By the end of six months E. H. had learned to recognize, sound and blend together into words all of the syllables listed on the charts. No pictures were used to illustrate the words. If he did not understand a word when he read it aloud he indicated his confusion clearly and refused to proceed until he grasped the meaning. Most nouns were recognized without difficulty when he heard himself say them in the blended form. When the syllable drills were completed the index pages had become replicas of the Northampton charts with the consonants grouped in the chart pattern on one page and the vowels in their positions on another.

A special notebook was started for the first work in reading sentences based on pictures pasted in the book. The pictures also served as sources for word lists. The names of every object in a picture obviously could not be used in sentences but the words could be listed and read aloud and identified with the pictured object. Thereby, the practice in recognition of the written symbols and their combinations into words was not limited to their appearance in the early sentences, which were necessarily simple and to some extent repetitious. The words built from each syllable drill were chosen because they all contained the consonant introduced by that drill, usually as the initial letter of

the word. For instance, the syllable drill which featured "t" was followed by words such as: "tea," "teeth," "tee," "toast," "toad," etc. The word lists made from the pictures had no such organization and the random order of appearance stimulated attention as well as recognition and recall of the various consonants and vowels which made up each word.

When the new notebook was started the index pages of the drill book which represented the symbol charts were opened near at hand where they could be consulted when necessary. As an additional help, the words for the first few pictures were written in two colors contrasting the consonants and vowels following the pattern used for words accompanying the drills. When the words were used in the sentences they were written in a single color and the contrast used to emphasize certain words rather than individual sounds.

The first picture pasted in the new book showed a corner of a living room with end tables at each end of a sofa in front of a curtained window. There were several chairs and another table with a flowering plant on it. The following words were written on the left-hand page opposite the picture:

chair	sofa
lamp	shade
rug	book
flowers	shelf
table	plant
match	ashtray
box	floor

After the words had been read and identified, the following sentences were written below the picture on the right-hand

page:

The lamp is on the table.
The ashtray is on the table.
The box is on the table.

The words "is" and "on" were written in a contrasting color to emphasize the use and position of the verb and preposition.

E. H. read each sentence aloud before the next one was written. It was a laborious process of sounding each letter and then blending them into the word patterns. The teacher helped silently by pointing to the voiced "s" under the "s" on the index page when he read "is" and to the "aw" when he came to "on," by pointing to a letter if he misread it or by guiding him with a finger where help was needed. Speech or explanation was avoided as much as possible while he was concentrating so that there would be nothing to distract him from the problem at hand. The nouns which had been previously read in the word list were sometimes remembered, but occasionally had to be reviewed. He read the first sentence over several times before he learned the motor pattern well enough to give his attention to the context. Then he looked at the picture, pointed to the lamp and indicated its position on the table. The next two sentences went more smoothly since there were only two word changes to be made in each one. By the time three sentences had been read the pattern was fairly well set and he could read the page with some degree of assurance.

Understanding was not the primary consideration in

the reading of the first sentences. The first objective had to be the translation of the written symbols into spoken words and context was secondary to recognition and articulation of words in the sentence sequence. If E. H. did not understand the sentence after he heard himself read it with moderate smoothness, the teacher said it for him or illustrated it. However, this assistance was not carried to the point where he was dependent upon the teacher's interpretation and made no attempt to grasp the meaning for himself.

When E. H. had finished reading the last sentence, it was covered and he repeated it from memory. On the first attempt he omitted the word "is," the sentence was uncovered and he read it aloud once more. The cover was replaced and he repeated it correctly. The first question was then introduced:

Where is the box?

The answer was the sentence which he had just said but he did not understand the question and looked puzzled. No explanation was given, the teacher pointed to the sentence he should say and he read it. The next question was, "Where is the lamp?" and he again needed help to answer. The third question, "Where is the ashtray?" brought forth the desired response and he found the answer himself.

Failure to understand was observed when any new question form was introduced into the lesson material. E. H. understood almost any question about his own activities,

interests or background in a conversational situation and his limited replies were appropriate. His reactions were very different when a question on the reading material was asked. His facial expression showed clearly that the words conveyed no meaning to him whatsoever and he was completely at a loss until the question form had been associated with the answer several times.

A skeleton sentence was written on the lower part of the page for a guide in answering the next questions about other objects in the picture.

The _____ is on the _____.

The teacher gave assistance in answering the next question, "Where is the rug?" by pointing to each word of the skeleton form. E. H. filled in the first blank with the word "rug" without prompting but "floor" had to be found in the word list. In answer to succeeding questions he referred to the written form for sentence structure or word only when he became confused. When he had answered several more sentences about the picture, the teacher picked up a book and put it on a table near him, then asked: "Where is the book?" After each answer a new illustration was set up with decisive movements as one object was put on another and the question asked with definite articulation and well spaced words. By the end of the lesson period he had said the sentence form ten to fifteen times and was saying it with some confidence when the teacher suddenly asked, "Where is your hair?" He

looked puzzled for a minute, then grinned and said, "The hair is on the head - not much though!"

The next lesson introduced "is in" and "are in" by means of a picture of an open refrigerator with well stocked shelves and words and sentences followed the preceding pattern. The word "ice-box" was substituted for "refrigerator" to simplify the reading. Two skeleton forms were given for guidance:

The _____ is in the _____.

The _____s are in the _____.

Similar drills with objects followed.

The third picture was another room and the prepositions "in" and "on" were used in random order.

The books are on the table.
The flowers are in the vase.
The plant is on the mantel.
The fire is in the fireplace.

The prepositions "under" and "beside" were taught in later stories and drills of the same type. The word "beside" was very difficult for E. H. to learn because it had no meaning for him. Many illustrations and frequent contrasting with the other prepositions finally brought understanding.

Most verbs were introduced in the present progressive tense since it is readily applicable to picture descriptions.

The farmer is feeding his pigs.
He has ten pigs.
The little pigs are running fast.

The contrasting color was used to emphasize the verb form. In the first sentence above, the word "is" and the suffix

"ing" were in contrast to the rest of the sentence. In the second sentence "has" was contrasted, and in the third the color change marked "are" and the suffix "ing."

E. H. read each sentence aloud until he could say it from memory. Questioning followed, first in the order of the story, then in mixed order. The memory of these sentences was for immediate recall only. After reading had progressed and further training in immediate recall improved his ability to retain language he was expected to recall sentences which had been studied in the previous lesson and at home.

Since E. H. showed a limited understanding of questions, new question forms were introduced one at a time, and the stories designed to require specific forms. A space at the lower part of the page on which the words were listed was reserved for the written questions. After E. H. had read and repeated the sentences of the story, the questions were written one at a time. When all of the questions had been written they were enclosed in a box of four lines, to set them apart from the other material. For the preceding story of the farmer and his pigs, enough question forms had been taught to use the following:

What is the man doing?
What are the little pigs doing?
How many pigs has he?

The teacher pointed to each word of the question as she said it aloud and E. H. watched. If he could not answer from

memory, he read the story over silently until he found the sentence that he wanted. He read the sentence aloud, the question was asked again and he was required to answer from memory. The procedure was repeated, if necessary.

After the first six or eight question forms had been learned E. H. began to respond to new forms more quickly. Before he began reading in a printed book he understood such questions as: "What happened to the boy?" "Where are the children going?" "How many boys are riding bicycles?" although there were still occasional lapses in understanding.

As reading progressed the sentences became more varied and began to assume story form. New words could be introduced in the sentences and the word list was dropped from the lesson. Later the pictures were eliminated and experience stories took their place. The information upon which these stories were based was given by E. H. Wherever possible, his own words were used with only the additions which might be necessary to complete the sentence.

We are going to Illinois for the holidays.
We will visit J_____'s sister.
It will take us about six hours to drive there.
I think we will be gone about a week.

The questions which accompanied the story were:

Where are you going for the holidays?
Who will you visit?
How long will it take you to drive there?
How long will you be gone?

Many of the questions which accompanied the experience stories

were asked by the teacher in eliciting the information and then written after the story had been put into the note book. The procedure was contrary to the pattern used in the picture descriptions where the question form was never introduced until the sentence which answered it was read and memorized. However, since the questions which were asked for information always concerned E. H.'s own activities, he had no difficulty in understanding them.

The stories were read and memorized in the class period, and E. H. was also required to study and copy them in writing at home. They were reviewed in the following lesson period and he was expected to answer the questions from memory, then to write his answer.

A new procedure was introduced for practice in the use of sentences in speech. A large mounted picture was shown and E. H. said and then wrote the names of objects he saw in the picture. Then questions were asked, such as:

Where is the lamp?
What color is the girl's dress?
What is the boy eating?
How many children are sliding on the ice?

All questions were worded so that they could be answered by the use of simple sentence forms which had been practiced in the stories. E. H. learned to listen carefully to the question and to remember words from it to help him construct his sentence. In answer to the question, "What is the girl eating?" he had only to change the position of the word "is" and add two new words to construct the sentence, "The girl

is eating an apple." A complete sentence was required for each answer. Although "an apple" could be considered an adequate response in everyday conversation, the purpose of the procedure was to give practice in constructing and using sentences. E. H. could have said "an apple" very easily, but there would have been little learning taking place.

If E. H. could not formulate the sentence correctly, a skeleton form was written for him, for example:

The _____ is eating ____ _____.

He had particular difficulty with verbs, especially the verb forms requiring some use of the verb "to be" such as "is eating," "am going" or "was walking."

After several months of practice with oral sentences, E. H. was shown a series of small pictures which depicted different stages in the climb of a kitten to reach a tasseled cord on a lamp. The lamp stood on a drum table at the foot of a sofa on which a man lay asleep. When the kitten clawed the cord, the light turned on, the man awoke and sat up and the frightened kitten jumped off the table and fled through a partly opened door. The following sentences were the result of the pupil's own efforts without questioning. The words underlined were given to him when he asked for help, the words in parentheses were put in by the writer to clarify the meaning.

The man is sleeping.
The kitty see something.
The kitty is climbing the sofa.
The kitty is climbing on the table.

It was a (wants the) tassel on her (the) lamp.
The lamp is turned on.
The kitty is frightened.
Somehow, the lamp is on but (and the) man is surprised.
The kitty is scampering on (out) the door, I guess.

Before E. H. had reached the point where the preceding sentences were possible, a transfer was made from the experience stories to printed material for reading. The first book used was a primer. He had no difficulty recognizing the printed forms of the letters and transferred readily from the cursive writing. He had more difficulty grasping the meaning of the printed sentences than he had with the picture descriptions or experience stories since there were not as many clues to guide him. When he did not understand a sentence, he read it over until it had meaning for him. His reading improved steadily, and by the time his training was interrupted he was reading sentences such as the following:

Where there wasn't much snow, the heifers could graze in the pasture and so feeding was cheap.

Many words were read as a whole the first time they appeared. E. H. still had to resort to sounding out a word on many occasions, and to reread many sentences. On the other hand, he could often repeat a sentence from memory after one reading, if it contained no more than eight to ten words.

Writing:

E. H. had learned to copy printed or written sentences before he was discharged from his first hospitalization. Although he copied correctly the material had no meaning for

him. However, he had gained some proficiency in the use of his left hand for writing so that exercises for training the left hand in writing movements were not necessary. He could not write single words or sentences either spontaneously or from dictation. He could sign his name.

In the training herein described, none of the lessons were devoted entirely to writing, but writing was often used to reinforce the auditory and visual associations between the written symbol and its sound and motor production. As each new symbol was taught the pupil wrote it several times while he said it aloud. When a new word was added to the list being built from a syllable drill, E. H. read the word sound by sound until he could repeat the sound sequence when the word was covered. Then he reread it, blending the sounds into the word pattern. Next, he wrote the word from memory, saying each sound as he wrote the letter associated with it.

The sentences of the stories written for reading practice furnished further material for writing. E. H. was allowed to copy the sentence the first time, then he folded the paper back and attempted to write the whole sentence from memory. When he finished he compared it with the original for mistakes, folded the paper again and made another attempt to write from memory. He was not given any material to copy unless he had first read it and understood it. Most of the writing practice was assigned as homework because he was

capable of doing it without assistance. E. H. was not persistent in his practice at home although he concentrated well in the lesson period even on days when he complained of a headache or toothache.

When the large pictures used for oral sentences were introduced E. H. could write the names of most of the objects he identified. On his first attempts at words he had to write sound by sound and often needed the help of the index pages which contained the written symbols. The following list was constructed from one of the early pictures. After the words had been written with some assistance, the list was dictated to him and he wrote twelve out of thirteen correctly.

cous (cows)	sheep	house
horse	bike	
farm	smoke	
boys	pole	
school	bell	
flag	door	

In spite of the small amount of independent practice, E. H. could write many one or two syllable words from dictation by the time his training ended. He wrote many of them without hesitation after he formulated the word mentally. If he made a mistake, he usually recognised it at once, crossed out the first attempt and said the word slowly aloud. If he was satisfied with the assistance the spoken word gave him he made a fresh start on writing it. He resented assistance until he had tried and failed. He could write short sentences from dictation and could write from memory sentences like the

following after he had read them aloud several times:

J_____ and I sat by the fireside and listened to the ballgame last night.

He wrote the following sentence from dictation. The words underlined show his attempts to write the word "children."

The chs chilr childrem children at school will have a costimes party Friday night.

The children at school will have a costume party Friday night.

Arithmetic:

Unfortunately, E. H. discontinued his training before his reading was fluent enough to begin work on arithmetic. However, it was obvious that some arithmetical ability had been retained since he figured change and gave the correct amount of money for purchases, even though he could not state the sums involved.

Summary:

E. H. was enrolled at Central Institute for the Deaf for approximately two years and nine months. During that time lessons were suspended for intervals which totaled over eleven months because of vacations and illnesses. When he entered for training his vocabulary was extremely limited, he could not read or write even the simplest language. When he left he could say a few simple sentences, his vocabulary was increased by several hundred words and he used more phrases. He could read orally in a third grade reader and follow the context, and he could write almost any word or

sentences which he could say.

E. H.'s spontaneous speech was telegraphic in style, but occasionally he used a sentence. He seldom made an effort to form a complete sentence except during the lesson periods. Sometimes he constructed a surprisingly good sentence when it was demanded in the classroom. Some examples of his usual speech pattern were:

J_____, car, garage.
J_____, downtown.
My sister, my house, visiting.

Nevertheless, he began to enter into conversations and even to argue a point if he disagreed with the views expressed. He answered the telephone and made a few calls to people he knew well.

Since there was every evidence that E. H. could continue to learn an outline of procedure was given to his wife for further teaching. Mrs. H. knew the procedure of his speech training well enough to teach him herself, since she had been present at almost every lesson, but he did not work well for her and they planned to find a school teacher who could help him several times a week. There was no speech correctionist in their new home.

The new house had only one floor so that E. H. could get out doors easily. Stores and picture shows were not crowded in a small town and he would go to them more often than he would attempt in the city. In spite of his aphasia, E. H. played an excellent game of bridge, and easily learned

to play several other games. Therefore, he could enter into many of the social activities of the town even though his speech was still limited. A letter from Mrs. H., written several months after they moved, said that he went to town every day, was planning for a hedge for the yard and had even swept out the garage himself.

SUBJECT L. F.

Classification: Amnesic aphasia complicated by alexia, agraphia and acalculia. Traumatic origin.

White male, aged 29. Right-handed.

L. F. enrolled for the speech training herein described in June, 1947, two years and five months after his injury and sixteen months after his discharge from the hospital. He had been a corporal T/5 on a tank destroyer through the African Campaign, the Anzio landing and several other engagements in Italy. On January first, 1945, he was on his way to the front after a rest period and suffered a fractured skull when the jeep in which he was a passenger collided with two large trucks. The information was given by his mother since L. F. did not remember the accident. He thought that he must have been hit by bomb fragments because his last memory was of going to sleep near his gun. He remembered nothing else until he awoke in a field hospital. Records are not available to indicate how long the period of unconsciousness lasted.

During hospitalization a tantalum plate was inserted slightly in front of the motor area of the left cerebral hemisphere. Its location was indicated by a line scar about one inch in front of the left ear. A similar scar, which may have been an extension of the first one, showed faintly on the right temple. A small depression about the size of a dime could be felt in the skull over the left occipital

lobe.

L. F. had complete use of the right arm and leg. A slight paralysis was confined to the toes of the right foot, according to his own report.

The only history of seizures was the subject's own report that he "fainted" once after his discharge from the hospital. He complained of a slight dizzyness at times.

There was no evidence of a restriction of the visual field. L. F. saw objects held within the normal range on either side.

L. F. was discharged from the hospital February 8, 1946. He had some speech lessons during the latter part of his convalescent, and learned to say and copy the names of a few objects. When he was interviewed at Central Institute for the Deaf his speech was abundant but rambling because he could seldom remember the name of the object he was talking about. Therefore, it could not be determined whether he had been taught by a speech teacher or an untrained worker. He said a "ward-boy" taught him to say and write some words by making him a book of pictures with the names written below. Since he used the term "ward-boy" for all of the male personnel of the hospital from the doctors on down the line, the statement conveyed little information.

School and Educational Background:

L. F. was unmarried and lived with his parents in a small flat in an old building in a poor part of the city.

The family was of meagre means but his mother refused to use the money he sent home while he was in military service. She put it into a bank to save toward his return.

L. F. was always neat and clean in his person and his dress. He often spoke of the inadequacies of his home and did what he could by way of painting and minor repairs to improve it. His personality was pleasing and he was always courteous and cooperative. Although he was quiet and deliberate, he had a ready sense of humor.

When L. F. returned home after his injury his rambling speech and inability to express his ideas clearly caused many of the neighbors to interpret his difficulties as mental illness and they tended to avoid him. Therefore, he ceased his attempts to renew old friendships. Other than the people at the school and at the Occupational Therapy Workshop which he attended, he saw no one except his immediate family and relatives.

L. F. had not completed his studies in a vocational high-school when his father lost his job and he quit school to seek employment. He worked in a garage for a while, exact capacity not determined, and when he entered the army was working in a burglar alarm factory making and installing burglar alarms. He said that he had been a poor student in school and although he enjoyed working with tools at the vocational school he felt that he had been sent there because he was "too dumb" for the regular high-school subjects.

During his speech training L. F. made slow but regular progress. Periods of concentration on his reading were frequently interrupted by word associations which the sounds stimulated. He said once: "My mind runs out of the window." For instance, when he was reading the syllable "ker" he read it correctly the first time but when he attempted to repeat it he said "dog" then "mongrel." Unless he was checked and brought back to the word to be read such associations could lead him far afield, as in the following incident: he looked at the syllable "sow" and said "pig" then "bridge." When he was allowed to follow his train of thought it was found that he had a relative who lived near one of the bridges across the river and who raised pigs. He would often analyse and philosophise on his condition. For example: "I was looking at the tree in a pot (evidently a plant at home), there are little green things on it. They will get bigger and bigger and they will come out -- that is like my speech." or, "My speech will be both old and new. Part of my brain got hurt and if another part talks for it, that will be new. The part that did not get hurt will be old."

APHASIC MANIFESTATIONS WHEN TRAINING BEGAN

Speech and Understanding:

L. F.'s speech was abundant and fluent but sprinkled with many circumlocutions that seemed irrelevant unless very

very closely followed. When asked what branch of the service he had been in, he said: "Well, you know the streetcar, the streetcar like a room, not bricks but iron." He would continue what seemed to be irrational ramblings. Analysis showed that he was describing something he associated with the object he was trying to name, in this case, a tank destroyer. Instead of "address" or "home" he always used the phrase "where I sleep," and all stores were "dime stores." He always recognized the word he wanted if it was said for him, or could choose it from a group said to him. Articulation and pronunciation were normal and clear with few exceptions, the word "diploma" was pronounced "paloma" but such mispronunciations were rare. His sentences were well constructed when he was not forced into circumlocutions because he could not say the name of an object.

Although L. F. could seldom name an object or its picture, he could either describe its use or purpose or associate it with something else to show that he recognized the object itself. He could imitate the name if it was said for him but could not recall it a few minutes later. He could recite the days of the week if helped at the start but not the months of the year.

There was no evidence of disturbance in understanding of speech either during the interview or in the teaching situations. Sometimes his answers to questions required careful analysis to determine that the difficulty was in

word-finding rather than loss of understanding of speech. For instance, he was trying to tell about something which his mother had made, after some roundabout descriptions it was determined that she had made a cake. The teacher asked: "What kind of cake was it?" L. F. said: "The Japs were on an island. There were - at the zoo - on it. They threw them down." The question was repeated and he answered: "I'm trying to tell you. The monkeys climbed up and threw them down." It was a cocoanut cake.

Reading:

L. F. had a complete loss of reading ability in both oral and silent reading. Occasionally the appearance of a word would bring an association of ideas but he could not name the word as it appeared in print or writing. An example was shown when he was asked to read the following newspaper headline:

JJ KILLED IN ARKANSAS TORNADO

He pointed to each word as he interpreted it: JJ - "like birthdays," KILLED - "like Flit on a fly," ARKANSAS - "hillbilly songs . . . I went over a bridge there once," TORNADO - "volcano . . . no . . . that goes up, this comes down from the sky." This was not his usual pattern, most of the time only a word or two in a sentence would cause a response. Weisenburg[1] described the inability to pronounce words which

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[1]Weisenburg, Mc Bride, Aphasia, p. 300.

seemed to be understood in some cases of amnesic aphasia. In most of the cases of amnesic aphasia described in the literature, reading was retained to a greater extent. Although L. F. could match written names of familiar objects to the correct picture, he could not read the word card alone. Reading was therefore impossible.

Writing:

Writing was as severely affected as the reading. L. F. could write nothing spontaneously except his own name. Writing to dictation was impossible. He could copy handwriting or print but he could not transpose printed letters into cursive script. He copied each letter carefully but the words had no meaning for him.

Sometimes he could draw a picture of an object from memory when he could not say the name. On one occasion he drew a map of the United States and marked the location of several cities he could not name.

Arithmetic:

Only the simplest calculations were possible. When the following example in addition was written for him, L. F. solved it by counting:

863 − 745 = 1608

"I start with the big one and count up." "That's eight. Now how do you write eight?" He then wanted to start with eight and count the digits in the next column but could not figure out how to do it. When told that was complete, to start on the next numbers, he counted to ten.

"How do you write ten?" When shown the number he wrote the "0" below the line and put the "1" in a small figure above for a carry-over. The procedure on the next column was the same, but he wrote both digits below the line.

He used a method of pointing to imaginary dots on each digit as he counted to find the name of the number. He was consistent in the location of these dots for each number up to ten except the digits 7 and 9 which confused him. For example:

:4: :8:

Numbers of two digits were read as one, two, for twelve, or two . . . one, two, three, four, for twenty-four. He could count to nineteen if given a start, but he could not say the "twenty" unless helped, and so on through the series. Now and then he could count by fives for a short time, but not consistently.

L. F. could neither name money nor tell time. However, he could indicate where the hands of the clock would be at mealtime or lesson time. He knew it was afternoon when "the little hand starts going downhill." He had worked out some names of his own for several coins, such as "brass" for penny, "white" or "like on a car" for a nickel, and "two of them" for a dime. He knew that five pennies had the same value as a nickel, two nickels the same as a dime and five nickels as a quarter. He could occasionally recognise and name a half-dollar, and was consistent in

naming a dollar bill. Since he could not count nor make change, he was at the mercy of the tradesman's honesty and carried only small amounts of money.

LESSON PROGRAM AND LENGTH OF TRAINING

At the time of writing, L. F. had been attending speech lessons for two years and nine months and was not ready for dismissal. Aside from the eight months or so when lessons were suspended for regular vacation periods, L. F. missed only six or seven single lesson periods because of minor illness. For the first three months he was given two one-hour lessons a week, then the program was changed to three hours a week and continued on that basis.

TEACHING PROCEDURES

Reading and Speech:

A notebook was started to train L. F. in the recognition of the speech sounds and their written forms as described in the chapter on therapeutic principles. He had no difficulty in the pronunciation of any of the sounds but his memory span for the written forms associated with the sounds was extremely short. He performed the lip and tongue exercises easily. Since L. F. Had no paralysis of sluggishness of the speech musculature the exercises served to create a consciousness of the movements in the kinaesthetic pattern which must be associated with a specific written symbol before the corresponding sound could be produced.

Three vowels and one consonant were introduced one at a time in the first lesson. The teacher said each new sound and L. F. imitated it, then the letter or letters which represented that sound were written on the index page and he pointed to the written form as he repeated the sound. A precise position of the speech mechanism was demonstrated for each sound and L. F. required to imitate it carefully to strengthen the memory of the motor pattern. He copied and repeated each new sound and it was then incorporated into a syllable drill. He could seldom repeat the sequence of two sounds for the required three times, either because he forgot the sound or became confused by some intrusive association. A letter often reminded him of a word which he could neither read nor write. When learning the long "e" in its most common form "ee" he invariably said "That's like a fish (eel)". The digression caused him to forget the sound of the consonant used in the drill and he had to start again at the beginning of the line of syllables. The secondary spellings were not used in the first few drills because he noticed the different spelling and became confused, thinking there should be a different sound also. After practice in two or three drills in which he learned the pattern of repetition the secondary spellings were introduced without difficulty and he accepted the fact that a sound could be represented by several spellings.

When the syllables were built into words L. F. read

a few correctly but usually said a different word, which was related either in meaning or in sound. Although he knew when he used the wrong word in speech, he did not recognize his error in reading until it was pointed out to him. The original association frequently blocked out the correct pronunciation even after the word was reviewed sound by sound. For instance, when the word "moon" was written he quickly said "sun." When the teacher said, "No, that is wrong. Read the sounds in it," he read each sound correctly and then said "sun" again. Therefore, word-building was postponed until he had formed a habit of direct association between sound and symbol. He combined the sounds into syllables easily in the drills after he understood that they were not words and were not supposed to have meanings.

By the time eight consonants and as many vowels had been practiced in drills a variety of words were possible using only the sounds learned. L. F. sounded out each word, one sound at a time, until the motor pattern was established, then the sounds were blended together to say the word. One day when the word "spoon" was written for him he repeated "s-p-o-o-n" several times, then he was told to say the first letter separately and combine the others. He said "s-poon" several times, looking puzzled, then: "Oh! Spoon. I look at it and there is nothing there, then all at once, a spoon comes out." After L. F. read each new word he practiced writing it while saying each sound aloud.

All of the speech sounds were practiced in drills and L. F. learned to read and write the words which accompanied them.

To keep L. F. alert to the differences of the various written symbols and to further strengthen the direct association between the written and oral form of each sound a special drill was given. The sounds were written on the blackboard by the teacher and he said each sound quickly as she wrote it. If he hesitated, the sound was said for him. The written symbols alternated between consonants and vowels. Any sound which caused difficulty was repeated frequently until a quick response was made consistently. For instance, if the "d" was not recognized, the pattern might be like the following:

d e-e d ee d a-e d i-e s oo d ea m ou t ai l d igh

Following the practice above, the positions were reversed and L. F. took his place at the board. The teacher dictated the sounds while he wrote them. Any uncertainty brought forth the index page and the letter was pointed out for copy, then repeated frequently in the succeeding dictation. The quick prompting prevented unwanted associations from becoming set and helped to build a quick and confident reaction. Because of L. F.'s short memory span and roundabout associations the drills were continued after sentence reading was introduced and the beginning of each lesson period was devoted to a quick review drill of the whole chart.

An interesting example of L. F.'s inability to inhibit a wrong association once it was formed occurred during one of the preceding drills. The symbol "oa" (as in coat) was written on the blackboard, L. F. looked at it and his lips assumed the position for "oo," he knew he was wrong and made a fresh effort, again his lips formed "oo." Then he smiled in an apologetic way and said: "I've got to say 'oo'." On the next try he said the correct sound easily. Unfortunately, he rarely recognized his error so quickly or so clearly when reading words but tended to accept the associated word as correct. One day he was looking at a newspaper before his lesson began and he came across the word "spring" in the caption of a picture. He brought the paper in to the teacher and said, "I had trouble with this word, but I figured it out. S-p then the rest of it is a bell. S-pell, spell." When told he had made a mistake he insisted it was "like a church bell." Finally he concentrated on the sounds in the word and said it correctly. The he said, "Oh, now I see, it is 'ring.' That is why I thought it was a bell."

The first sentences were introduced in a special notebook in which pictures were pasted and words and sentences written as shown below.

ice-box	milk	The milk is in the ice-box.
ham	cake	The fruit is in the ice-box.
eggs	meat	The chicken is in the ice-box.
fruit	lemons	The ham is in the ice-box.
		The cake is in the ice-box.
		The eggs are in the ice-box.
		The lemons are in the ice-box.

house	sky	There are three houses.
hill	roof	There are four hills.
rock	red	There are three red roofs.
trees		There are many trees.

living-room		This is a living-room.
sofa	table	The books are on the table.
window	desk	The lamp is on the desk.
picture	books	The picture is over the mantle.
rug	chair	The rug is green.

Although the stories were simple in structure, they presented a definite reading challenge to L. F. He found it difficult to transfer the technique of sounding out to the words of a sentence. Concentration on one word wiped out the memory of those which preceded it and he had to reread several times before he understood a sentence. He often recognised a word as one which he had said a short while before but he could seldom say it without sounding it out again. An experiment had been made earlier with his reading. The teacher read aloud with him in a primer, remaining silent when he seemed to recognise a word so that he was given an opportunity to try it alone. He was able to read a few scattered words without help but his performance was far from consistent and showed no improvement after several weeks' practice. The attempt to bypass the fundamentals of reading was abandoned and all of the time put in on the drills and word-building.

After a series of five or six pages of sentences such as the ones above, the grammatical construction began to be more varied, as in the sample below:

lumber	This is a saw mill.
wood	There is a big pile of lumber.
saw mill	The men are cutting wood into planks.
buzz-saw	They have a buzz-saw.

A later story consisted of the following sentences:

stirrups	This is a western scene.
spurs	A cowboy is sitting on a horse.
saddle	They are on a high ridge.
halter	Cattle are down in the valley.
chaps	The horses mane is blowing in the wind.
cattle	
bit	
reins.	

Each story was accompanied by a picture until he showed some skill in reading and understanding new words and sentences. The pictures were then eliminated and experience stories written from information furnished by L. F.

L. F. began his first reading of printed material in a primer, not the same one used for the earlier experiment. He was the only one of the group who had any difficulty in transferring from cursive script to print and his confusion was largely confined to the capital letters. He sometimes confused "a" and "g," and "d" and "b," but most of the lower case letters caused no trouble. If he did not recognise a printed letter the written form was pointed out on the index page of his notebook which was kept open beside him. As reading progressed he began to recognise many words as wholes and had to resort to sounding out less frequently.

However he was not always consistent in his recognition of words, sometimes he would have to stop and sound out a word which he usually read as a whole.

When L. F. advanced to a second reader the longer sentences often caused him to lose the meaning. He reread each sentence several times, then the sentence was covered and he attempted to repeat it from memory. He enjoyed the challenge, and the recall of the words of the sentence frequently made the meaning of the sentence clear to him. If he still did not understand, the teacher went over it with him and explained the meaning if necessary. Sometimes the meaning of a sentence was lost because his train of thought was broken by an association which superceded the printed word which caused it. One sentence contained the word "surprise," he sounded out "s-ur-p" and said "syrup," then "r-i-se," "That's rice, and you put syrup on it." He could not break that association until the word was divided as follows, "sur pri-e s," he read it several times before he said, "Oh, surprise! I kept thinking of syrup." Another time he explained how he figured out the word "principal" when he tried to read his book alone. "I saw a prince and there was a picture of a man at a desk, so I said 'What's he got to do with it?' and I thought . . . principal." This was one of the few times that his association lead him to the word he wanted.

No special work was done on speech with L. F. beyond

giving him a word needed now and then when he attempted to tell of some experience or idea. The practice and use of words in reading and writing increased his vocabulary and his speech became much more direct. Occasionally he would not know how to express himself and would revert to his original style.

Writing:

L. F. wrote each new word as it was introduced in the word lists accompanying the syllable drills. At the beginning he had to copy each word first because he could not remember how to form some of the letters. Later he could read and say the word and then write it without copying. He said each sound aloud as he wrote it. Pictures were used to provide practice in object naming and in writing words. L. F. was shown the picture, he said the name of the object, broke it up into its component sounds and then wrote the word as he repeated the sounds. All words used had either been presented in one of his word-lists or were phonetic in their spelling. Later, words were dictated for him to sound out and write. Sometimes he was given a group of pictures of objects which had been previously named and written in the lesson period and he wrote the names as homework. His list was gone over in class and he corrected his own mistakes, if possible, frequently with guidance by the teacher. Once when he wrote "bete" for "beat," he looked at it, and said, "That doesn't look right. That one can't

be on the end and there should be another one inside." He erased the first attempt and rewrote it "boat." Similar mistakes were more frequently recognized and the choice between two spellings for the same sound more often made correctly. He knew when a word was misspelled but could not always correct it.

When the sentence notebook was started for reading, it was also used as material for writing practice. After he read each sentence until he could say it from memory, he practiced writing it. He said each word aloud, then sounded each letter as he wrote it. If he lost the sequence of the sentence because he was concentrating on writing a word, he read over what he had written and said the rest of the sentence. Sometimes he could not remember the complete sentence and the teacher said it for him. If he were allowed to reread the sentence in his book he attempted to hold the visual image of the written words until he could transfer them to the blackboard without regard to sound or meaning. Since the goal of teaching was to enable him to write his own ideas, such a procedure had little learning value. Association of sound and written symbol required a great deal of concentration until the pattern was established and L. F. reverted to what he thought was an easier way when supervision was removed. When he was told to practice writing the sentence at home, he brought in at least twenty copies of each sentence, but it was obvious that he had not followed the orders given him to read one, cover it, say it aloud,

then write it while sounding out each word. He was then to compare his writing with the original to find any mistakes, fold his paper back so that he could not see the previous sentence and write it again. The steps had been gone through in the lesson to be sure he understood the directions. His papers showed that he had simply copied the sentence on the line above, since any mistake was repeated in all following sentences. Moreover, the mistakes were often the substitution of a wrong letter which he would have noticed if he had been saying the sounds as he wrote them. The homework improved his handwriting but did not increase his ability to write words spontaneously.

L. F. memorised a few words from his copying, such as "the," "this," "we" and "went." However, if he attempted to write them quickly in a different sentence he was apt to write "this" for "the" or "went" for "we" without realising the difference.

The only other copying assignments given L. F. were from his reader, when he copied the sentences which had been read in the lesson period. He could not transpose the printed letter into cursive script, so he carefully reproduced the printed form. He was given some supervised practice in using the sound of the letter to help him recall its written form. First he read the sentence through, then said the sounds of the letters of each word as he wrote them. He found that he could usually write the letter if he listened to himself say

the sound. Unphonetic spellings sometimes confused him but as he became more familiar with the two forms of the letters he made fewer mistakes. The concentration and alertness required to write the words gave learning value to copying the printed material.

L. F. began to attempt an infrequent spontaneous sentence when he was practicing alone. The best ones were:

I save a grass happer in the grass.
(I saw a grasshopper in the grass.)

Bill and I want to the store for same bread and ham same pies, than and what home."
(Bill and I went to the store for some bread and ham some pies, and then went home.)

The punctuation was his own. Usually he was disgusted with his mistakes and would not attempt much writing without supervision. Most of his mistakes in the sentences above were caused by trying to write a word as a whole, probably from a visual image, when he seemed to lack the power of selection between the word wanted and one similar in form. He would have recognised many of his errors by rereading carefully. Although he recognised misspellings when he was sounding letters as he wrote, he accepted the word he had written quickly as the word he had meant to write.

Arithmetic:

At the time of writing L. F. was not receiving lessons in arithmetic because his reading difficulites were still severe enough to prevent successful performance in arithmetic. Preparation for teaching the use of numbers was started

early, however. Numbers were used in many sentences. Numbers' names were taught and associated with the numerals up to twenty. The date was written at the head of each page of the sentence notebook and he found it on the calendar and said the name of the day and the date.

The coin names were taught and he learned some recognition of their values.

L. F. sometimes seemed to have a moderately good grasp of number concepts, and began to use a few numerical values correctly in speech. It was evident, however, that acalculia was the correct diagnosis and that concentrated teaching would be necessary in arithmetic.

Summary:

Unfortunately, L. F.'s training was not completed at the time this summary was written and a final survey of improvement was not possible. There has been a slow but steady improvement in word-finding for speech and in reading and writing in the two years' training given this subject. There was a marked improvement in directness of speech, which encouraged him to begin to renew a few friendships with men he had been avoiding. L. F. was not aggressive in his social contacts nor in his approach to learning. He could not be hurried in physical movements or in mental reactions. He lacked initiative and persistence in practice without supervision, although he would follow a definite assignment. However,he sometimes missed the purpose of the

assignment by using what he considered an easier method of accomplishing it.

At the end of two years training L. F. had made marked progress in speech, and moderate progress in reading and writing. New learning was more easily grasped and the prognosis seemed favorable for more improvement with continued teaching. There was no expectation of a complete return to normal ability, but it seemed possible that he would eventually be able to do some sort of remunerative work.

CHAPTER VII

DISCUSSION

Clinical experience with many cases is the most valuable asset in examination and retraining of language abilities damaged in aphasia. Although each aphasic must be treated as an individual, certain similarities frequently appear. The similarities between different cases are the bases for classification and for teaching principles and procedures. An entirely new set of teaching procedures designed for each pupil would be impractical and unnecessary. However, an adequately trained and experienced teacher may seem to have almost endless variations of procedures available. Careful investigation would show that the choice was empirical and rarely something devised on the spur of the moment. The experienced clinician has certain teaching principles in which he believes and which he has found practical. Modifications and variations of procedures have been developed from the basic principles. When and how to vary procedures to fit the needs of an individual case can be learned only through practice, but some assistance may be gained through study of the ways in which others have handled similar situations.

The writer has presented a description of general clinical principles and procedures used for teaching aphasic

adults, and has elaborated modifications and variations suited to four individual cases. Only representative details are given since exact details of procedures must inevitably vary from case to case and depend on the skill and ingenuity of the teacher to meet the needs of the pupil. It has been assumed throughout that those who might be interested in the procedures presented would have some familiarity with the problems of the adult aphasic.

Although procedures must be modified or prolonged for different individuals, the basic principles remain constant.

Each step of the teaching program must be learned before a new learning problem is added.

Repetition must not be allowed to become automatic. It is the responsibility of the teacher to keep it dynamic and purposeful. Monotonous repetition represents wasted time whereas repetition with attention induces concentration and learning.

The adult pupil must be given an acceptable, but not prolonged, explanation of the purpose of the procedures to be used.

The demand for accuracy and concentration in the beginning steps not only eliminates reteaching later but creates in the pupil a sharing of responsibility for his progress. In cases where the speech muscles are affected by paralysis, the word "accuracy" is interpreted to mean "to

the best of his ability to make the necessary movements." If the pupil is conscious of the movements which are associated with each sound, continued practice leads to improved production.

The primary goal of all retraining in aphasia is optimum restoration of control of word usage. Normal function of the language areas of the brain has been disrupted and retention and recall of language is blocked in varying degrees according to the location and extent of cerebral damage. New patterns of association and coordination must be formed. These can be stimulated by persistent, but controlled, demands which are simple in the beginning and become more complex as the response improves. Progress may be limited when procedures are based entirely on the presentation of whole words in treatment of a pathology where defective memory for words and language forms is an outstanding characteristic. Therefore, it seems more efficient to strengthen the associations between the sounds and symbols which are used to form words as the foundation for future independence in recognition and use of words. The foundation forms part of a teaching plan in gradual steps designed to improve the memory span by means of systematically increased demands made upon it.

All four of the primary skills of word usage -- speaking, reading, writing and understanding of speech -- should be trained together as closely as possible, to reinforce

each other. In many cases the understanding of speech may be virtually intact and will not require specific procedures, but the teacher should be constantly on the alert for any indication of failure in comprehension.

The constant use of exact articulation in reading aloud trains the speech muscles to move easily and accurately and also improves auditory discrimination. In cases where sentence structure is not seriously defective, the critical attitude thus engendered also functions for spontaneous speech.

The writer presents some comments based upon seven years' experience in teaching aphasics:

1. The aphasic can profit by training given several years after the onset, but early training is preferable to avoid despondency and the formation of habits of speech avoidance.
2. Daily lessons are desirable, but much can be accomplished in less frequent lesson periods.
3. The individual who depended on "skimming the surface" methods of learning before he was aphasic usually attempts the same method in performing tasks given in retraining.
4. Aphasics who learned to read by the "whole word" method as children are often more difficult to teach than those who learned by phonetic or syllable approach. The former tend to be impatient when they

cannot recognise a word immediately and prefer to guess rather than analyse.

5. The aphasic individual is seldom a good judge of the procedures which will prove most successful for him.

6. Realisation of improvement in a language ability which the pupil thought hopelessly lost is the best psychological treatment which can be given.

7. There has been no observable personality change in the adult cases taught by the author.

8. Interest in the lessons and intelligent help by someone in the family can do much to encourage a pupil and may shorten the training period.

9. Areas of deficiency cannot be overcome by stimulation of residual abilities alone. Teaching procedures must be directed toward development of those skills which are deficient.

10. Quick responses to training are heartening when they occur but should not be anticipated. Teaching methods designed to lead to a sudden "flowering" must fail more often than they succeed, while those planned to carry the relearning process from start to finish will facilitate rapid recovery when it is possible. Unneeded steps can then be eliminated as they are proved unnecessary.

11. Aphasia caused by a unilateral cerebral lesion can be

improved by teaching in the majority of cases, provided the lesion is not progressive or in cases where behavior in situations where language is not involved is not markedly abnormal.

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